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# DIETS IN TUBERCULOSIS

BY EDWARD D. BARDSWELL

J. E. CHAPMAN

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**DIETS IN TUBERCULOSIS**  
**PRINCIPLES AND ECONOMICS**

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OXFORD MEDICAL PUBLICATIONS

# DIETS IN TUBERCULOSIS

## PRINCIPLES AND ECONOMICS

BY

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TO

**H.R.H. HELENA**

**PRINCESS CHRISTIAN OF SCHLESWIG-HOLSTEIN**

**PRESIDENT OF THE NATIONAL ASSOCIATION FOR THE  
ESTABLISHMENT AND MAINTENANCE OF SANATORIA  
FOR WORKERS SUFFERING FROM TUBERCULOSIS**

**THIS BOOK IS RESPECTFULLY**

**DEDICATED**

**43444**

## PREFACE

A Grant from the Government Grant for Scientific Investigation was made by the Royal Society towards the expenses of the various researches recorded in this book. The work described has extended over some seven years, and this book, an abstract of which appeared in the Proceedings of the Royal Society, represents our final Report.

NOEL BARDSWELL.

J. E. CHAPMAN.

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## CHAPTER I

### PRELIMINARY REMARKS

It may be said without exaggeration, that the outlook for the consumptive has, during the past twenty-five years, been completely revolutionized. Pathological research, and clinical observation, have gradually led to a fuller appreciation of the nature of consumption and to the evolution of more satisfactory treatment than has been followed, in this country, for many years.

Bodington, writing in 1840, aptly sums up the curative value of the treatment of consumption, as carried out in his day, in the following words:—

‘I believe, having mentioned the shutting-up plan in close rooms, the use of antimony and digitalis, if I add the use of demulcents, of blisters, leeches, plasters, &c., I shall have described the helpless and meagre system of medical treatment of consumption in general use at the present day, the utter uselessness of which is so well known and so obvious that the members of the medical profession in the towns are in the habit of dismissing their patients to some distant seaport or watering place, where, falling under precisely the same mode of treatment, they there commonly die. The grave-stones of the churchyard of many of these places of resort of the consumptive patients bear testimony to the truth of this remark.’

The discovery of Davos and the curative value of high

altitudes represented a big advance in our knowledge of dealing with consumption, and held out hope of cure to many by whom a diagnosis of consumption was looked upon, and rightly so, as a death-warrant.

It remained, however, for the re-introduction of Bodington's method of treatment, now generally spoken of as the Sanatorium, or Open-air treatment, to convince the profession and the public that pulmonary tuberculosis is, indeed, a curable disease.

The advent of Sanatoria and the return with profit, as Osler expresses it, to 'the older measures of diets, exercise, baths, &c., with a diminished reliance on drugs', have been among the most noteworthy features of recent medical progress. No one can doubt the influence that Sanatoria have exercised in spreading the use and knowledge of the above-named measures. It is difficult in fact to estimate the far-reaching nature of the Sanatorium movement; certainly, as a means of cure, of prevention and of education, it has been an immense power for good both for the consumptive and for the general welfare of the community. One of the aims of those who are interested in what has been fitly termed the crusade against consumption, is to bring the Sanatorium treatment within the reach of every consumptive. The most potent obstacle in the way of attaining this ideal is, and always has been, the cost of providing the necessary accommodation. We must remember, however, in the treatment of tuberculosis, valuable as Sanatoria are, it is the principles which are taught and carried out in them that are the absolute essentials for the cure. Much can be done outside the Sanatorium in the way of giving instruction to consumptives in the elements of a system of treatment

which at the present time offers them the greatest hope of recovery.

These principles are—the carefully ordered life, with freedom from fatigue and worry; carefully regulated hours of rest and exercise; and, most important of all, abundance of fresh air and generous but not excessive feeding.

These principles are within the reach of all.

#### **Rest.**

Rest can always be had, and exercise too, although it is only right to say, that for the happiest results, the doses of these two ingredients of Sanatorium physic require regulation by some one with more experience of the disease than is possessed by the average layman or indeed by many a physician.

#### **Fresh Air.**

Fresh air, or at least relatively fresh air, is to be had practically anywhere and everywhere.

We say relatively fresh air, advisedly. We have seen most striking changes for the better in the case of consumptive poor removed from crowded tenements into a few acres of ground surrounding a hospital situated in the midst of a big manufacturing city; a change no whit less striking than the wonderful improvement in health that follows the removal to a country sanatorium of a consumptive clerk from a city office.

The air to be had in the public parks of our large cities is, indeed, fresh air to the thousands who live pent up in the crowded streets adjoining them. Quite a number of consumptive working men in whom we



have been interested, have derived the greatest benefit from spending much of their time in these open spaces. At night-time, an open window in a house, even in a crowded street, unquestionably means a fresher room than one in which the window is always closed. Any air, in short, is better than the vitiated air of an ill-ventilated house. Fresh air, then, is within the reach of nearly every one who makes the effort to get it.

### Diet.

The other great essential for the cure of the consumptive is a nourishing diet in a sufficient amount. In the same way that air is to be had practically by every one, so is an adequate diet within the reach of the very large majority, excepting perhaps the very poor. That inadequate and even improper diets are taken by very many of the poorer classes when in ordinary health is beyond question. This is well brought out by Rowntree in his work *Poverty, a Study of Town Life*; and it is from information in his book that the table on the next page has been compiled.

It shows the nutritive value in terms of proteid and Calorie value of the diets taken by fourteen working-class families in York, with an income of something less than 26s. a week.

Compared with the standard of dietetic efficiency for the working classes adopted by Rowntree, viz. a diet giving 125 grammes of proteid and 3500 Calories daily, the average diet taken by these fourteen families was very inadequate, being 30 % below standard in its proteid value and 23 % below standard in its Calorie value. Rowntree's standard of dietetic

efficiency is that generally accepted by physiologists and forms the basis of practical dietetics at the present time. The work recently published by Chittenden<sup>1</sup> has thrown some doubt upon the reliability of this standard of dietetic efficiency generally adopted by

TABLE SHOWING THE NUTRITIVE VALUE OF THE DIETS TAKEN BY  
FOURTEEN TYPICAL WORKING-CLASS FAMILIES (from Rowntree).

	Value of Diet taken.		Comparison with Standard.	
	Proteid (grammes).	Calories.	Deficiency in Proteid value.	Deficiency in Calorie value.
<i>Standard Diet used by Rowntree.</i>	125	3500	—	—
1 Labourer	117	2625	51 gram.	875
2 "	91	2716	34	784
3 "	82	2409	43	1091
4 "	92	2703	33	797
5 "	63	2364	62	1136
6 "	74	2329	51	1171
7 "	88	2455	27	1045
8 "	79	2355	46	1145
9 "	115	2816	10	684
10 "	93	2985	32	515
11 "	79	2426	46	1074
12 "	97	2931	28	569
13 Carter	102	3193	23	307
14 Polisher	94	3285	31	265
Average	88	2681	37 (30 %)	819 (23 %)

physiologists. His contention is that good general health can be maintained upon diets which are not only much poorer in proteid, but lower in total fuel value than diets generally held to be physiological. In his book he gives practical and experimental data in support of his statement that a diet containing but


<sup>1</sup> *Physiological Economy in Nutrition with special reference to the Minimal Proteid Requirements of the Healthy Man.*

55 grammes of proteid and 2600 Calories is sufficient for the requirements of those in normal health. We think, however, that until further work is done upon this interesting subject, we cannot accept Chittenden's work as proof of our present teaching, as to the dietetic requirements of the average normal person, being fallacious.

Certainly, a diet giving but 50 grammes of proteid and 2600 Calories is inadequate for the treatment of a consumptive working man. These results of Rowntree's inquiry may be taken as being representative of the social life of the working classes in any large town. From time to time we have carefully analysed the financial budgets of working-class families which have come under our notice, and have often found the same unsatisfactory conditions with regard to the diet taken.

That inadequate and unsatisfactory diets are often taken by the poorer classes is very frequently due to the small amount of money available for the purchase of food, after such necessary things as fuel, rent, clothes, &c., have been paid for. Not seldom, however, we have found upon close inquiry, that there is really enough money to buy an adequate diet for a family, but the purchasers, who in most cases are the wives, knowing nothing of the nutritive values and economics of food-stuffs, lay out their money to a poor advantage. In either case the result is the same, viz. an insufficient diet.

A consumptive who comes from these poorer strata of society stands little or no chance of returning to better social and financial conditions on discharge from a sanatorium.



It is more probable, indeed, that his conditions in these respects will be more adverse after discharge than before admission; and, in addition, as a consumptive, he requires a diet of a higher nutritive value, and consequently of a greater cost than was sufficient for him when in normal health.

His working, and in consequence, his wage-earning capacity, moreover, may not be quite so good as before his illness, while his income has a tendency to become smaller and more precarious. The wage-earning capacity of consumptives after their discharge from sanatoria, closely associated as it is with the question of the amount of money available for the purchase of food, is of such importance, that we have made some inquiries from working-class sanatoria as to their experience upon this point.

Colonel Montefiore, of the Charity Organization Society, wrote to us as follows: 'As to the subsequent wage-earning capacity of our phthisical patients, I regret I cannot give you any very definite information; when compiling our statistics recently, I inquired into some few cases in which there had been a change of employment, and from the replies received, it did not appear that the wage-earner had suffered a diminution of wage. To furnish you with definite data, in all our cases, would entail an exhaustive inquiry on the part of our district committees, who, I think, could scarcely be asked to undertake it. I can affirm that in our best cases, even where there has been a change of employment, there has seldom been a decrease of wages; in our second best cases, it would be wellnigh impossible to get a proper return, but, of course, their impaired condition would involve a considerable

ANALYSIS OF THE WAGE-EARNING CAPACITY AND OCCUPATIONS OF CONSUMPTIVE PATIENTS TREATED AT  
KELLING SANATORIUM.

(A) PATIENTS WHOSE WAGE-EARNING CAPACITY HAS BEEN UNALTERED OR INCREASED.

Before Treatment.		After Treatment.		Remarks.
Occupation.	Wages.	Occupation.	Wages.	
Gardener	30/-	Gardener	30/-	Same employers
Gardener	18/- and cottage	Gardener	18/- and cottage	Same employer
Clerk	25/-	Clerk	27/-	Same employer
Electrician	9d. per hour	Electrician	9d. per hour	Same employer
Cardboard box maker	30/-	Cardboard box maker	30/-	Same employer
Shoemaker	14/- to 15/-	Shoemaker	'Just enough to live on'	Not in a factory
Labourer in Iron Works	18/-	Farm work in Australia	12/6 all found	In Australia
Railway Clerk	8/-	Dairy hand	17/6 all found	Same employers
Farm labourer	12/-	Farm labourer	12/-	Same employer
Labourer in Iron Works	18/-	Labourer in Iron Works	18/-	Same employer
Clerk (Paper Warehouse)	17/6	Clerk (Paper Warehouse)	17/6	Same employer
Clerk (Glue Factory)	30/-	Clerk (Glue Factory)	30/-	Same employer
Farm labourer	9/-	Farm labourer	25/- all found	In New Zealand
Dental Mechanic	42/-	Dental Mechanic	42/-	Same employers
Insurance Agent	20/-	Insurance Agent	22/-	Same employers
Clerk (Solicitor's)	10/-	Clerk	15/-	
Painter	20/-	Groom and Gardener	18/- and cottage	Same employer
Boot Factory hand	10/-	Boot Factory hand	10/-	Same employer
Nursery gardener	16/-	Nursery gardener	16/-	More responsible position and new employer
Printer	30/-	Printer	(?) increased	

# PRELIMINARY REMARKS

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Solicitor's Clerk	17/-	Solicitor's Clerk	17/-	Same employer
Ironmonger's Manager	82/6	Ironmonger's Manager	85/-	Same employer
Cashier	30/-	Cashier	86/6	Same employer
Apprentice (engineer)	15/-	Clerk in Engineer's Office	22/6	Same employers
Railway Porter	18/-	(Cost Office)		
Clerk in Insurance Co.	£110 per annum	Motor Driver	80/- and livery	Same employers,
Groom	20/-	Clerk in Insurance Co.	£180 per annum	promoted
Iron moulder	22/6	Coachman	11/- all found	Now with country
Printer	26/-	Iron moulder	27/-	family in London
Clothing factory	22/-	Motor Driver	50/- + Board	Same employer
Milkman's apprentice	9/4		and Lodging	Same employer
Clothier's shopman	50/-	Clothing factory	28/-	Same employer
Railway Telegraph Clerk	20/-	Milkman	18/-	Same employer
Farm labourer	10/-	Clothier's shopman	50/-	Same employer
Labourer in Iron Works	19/-	Goods Station Master	22/-	Same employer
Clerk in Coal Office	20/-	Motor Driver and gen. use	15/- all found	
Gasfitter on Railway, employed by M. & G.N.R.	24/-	Labourer in Iron Works	19/-	Same employer
Clerk in Boot Factory	24/-	Clerk in Coal Office	28/-	Same employer
Labourer in Iron Foundry	30/-	Gasfitter	24/-	Same employer
Grocer's Shopman	10/6	Clerk in Boot Factory	35/-	Same employer
		Labourer in Iron Foundry	30/-	Same employer
		Book-keeper	26/-	Former employer

Average gain in wage = 4/- weekly.

(B) PATIENTS WHOSE WAGE-EARNING CAPACITY HAS BEEN DIMINISHED.

<i>Before Treatment.</i>		<i>After Treatment.</i>		<i>Remarks.</i>
<i>Occupation.</i>	<i>Wages.</i>	<i>Occupation.</i>	<i>Wages.</i>	
Stonemason Gunmaker	36/- 40/-	Assurance Agent Gunmaker	20/- 20/-	Same employers, worked half time
Boot Factory hand Shop Assistant	28/- 14/-	In Leather Warehouse Travelling on commission (fancy goods) Insurance Agent	15/- 6/- 12/- and com- mission	
Boot Factory hand	35/-	Builder's labourer Motor cleaning and gen. u-e Hay and Corn Store	16/- 16/- 20/-	Employed by brother Same employer, less work
Grocer's Carter Yachtsman Carman	17/- 20/- 28/6	Stockbroker's Clerk	£120 per annum	
Stockbroker's Clerk	£165 per annum	In fruit plantation Market gardener Policeman	14/- 15/- 25/7	Same employer Gave up grooming the Inspector's horse
Plumber's mate Market gardener Policeman and groom	18/- 18/- 27/6	Farm labourer Printer Insurance Agent	13/- 32/- 18/-	
Grocer's Assistant Printer Wheelwright Painter	15/- 38/- 34/- 25/-	Canvasser and Collector for Church Army Coach painter Leather dresser Carpenter Painter	18/- 30/- 30/- 9/- 20/-	Same employer Same employer
Coach painter Leather dresser Carpenter Painter Clerk in Boot Factory	35/- 38/- 18/- 25/- 35/-	Canvasser for paper me- chanic	27/-	

Average loss in wage = 8/6 weekly.

# PRELIMINARY REMARKS

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## ANALYSIS OF THE WAGE-EARNING CAPACITY AND OCCUPATION OF CONSUMPTIVE PATIENTS TREATED AT THE SHEFFIELD AND MUNDSELEY SANATORIUM (DR. BARDSWELL AND MR. CHAPMAN).

### (A) PATIENTS WHOSE WAGE-EARNING CAPACITY HAS BEEN UNALTERED OR INCREASED.

Before Treatment.		After Treatment.		Weekly gain in income.
Occupation.	Wages.	Occupation.	Wages.	
Professional Vocalist	45/- a week	Professional Vocalist	Say 45/- a week	+ 2/- weekly
Clerk	25/-	Clerk	27/-	Same
Upholsterer	30/-	Upholsterer	20/-	Same
Covent Garden Porter	25/-	Covent Garden Porter	25/-	
Mechanic and Cycle Works	25/-	Mechanic	25/-	
Coal Miner	16/- to 18/-	Telephone Co.'s labourer	21/-	
Coachman	30/-	Coachman	34/-	+ 4/-
Gardener	27/-	Gardener	32/-	
Workhouse Attendant	30/8	Workhouse Attendant	30/8	
(B) PATIENTS WHOSE WAGE-EARNING CAPACITY HAS BEEN DIMINISHED.				
Brewer's Carman	27/-	Coachman	23/-	- 4/-
Restaurant Cook	36/-	Omnibus Conductor	30/-	- 6/-
Wood sawyer	32/-	Wood sawyer	30/-	- 2/-
Salvation Army Officer	30/-	Insurance Agent	28/6	- 6/8
Chaff cutter	24/-	Casual labourer	7/6	- 16/6
Type founder	33/-	Tram Car Conductor	28/-	- 5/-
Razor blade forger	34/-	Razor blade forger	20/-	- 14/-
Steam hammer driver	55/-	Steward of Working Man's Club	35/-	- 20/-
Silversmith	35/-	Traveller	20/-	- 15/-
Box maker	35/-	Van driver	25/-	- 10/-



decrease in their wage-earning capacity—though to what degree, it would be very difficult to compute.'

The most valuable evidence on this point that we have obtained has been kindly given us by Mr. W. J. Fanning, Resident Physician of Kelling Sanatorium, Holt, Norfolk. The tables upon the preceding pages, showing the occupations and wages of a number of the Kelling patients, before and after becoming infected with tuberculosis, with a record of the wages earned under both conditions, have been prepared from data given us by Mr. Fanning.

The Kelling statistics—which are probably exceptionally satisfactory, since great efforts are made in this Sanatorium to secure suitable work for the patients upon discharge—show that some 65 % of the patients return to the same wages as they earned before admission to the Sanatorium, and some 35 % return to an appreciably reduced wage.

A similar analysis as to the wage-earning capacity of nineteen consumptive working men, treated by us at Mundesley and Sheffield, is shown in the preceding table.

In our experience, some 50% returned to the same or to an increased wage, and 50 % returned to an appreciably smaller income.

The average weekly loss of income of our ten patients who suffered a reduction in wage-earning capacity amounted to 9s. 9d.

The significance of this weekly loss of income will be especially appreciated by those who have interested themselves in the social conditions of the working classes.

In many cases, such an appreciable diminution of

income means that there is not sufficient money available for the purchase of a really satisfactory diet either for a consumptive or for his family. As we have previously stated, diets adequate in nutritive value can be bought at a surprisingly small cost, certainly at a figure at which many of the poor buy unsatisfactory diets. This, however, requires special knowledge, not possessed by the average person in any social class.

Apropos of the figures just given, we have to bear in mind the important fact that the wage-earning capacity of consumptive patients after discharge, as recorded in the tables, is shown at its best. The figures, indeed, represent the work and wages returned to immediately upon discharge.

Unfortunately, in a good many instances, and especially in the case of patients with somewhat advanced disease, the same degree of working and wage-earning capacity is not maintained.

Writing to us upon this interesting subject, Dr. Grey, Medical Superintendent of the Durham County Sanatorium, says: 'I regret that we cannot help you with any definite statistics. There is no doubt that the majority of our patients have to return to less remunerative work after treatment, although, whenever possible, we recommend them to return to their former employments, and this especially in the case of skilled workmen.'

Dr. Hughes, Medical Superintendent of the Westmoreland County Sanatorium, writes to us: 'I cannot give you exact figures, but can give you a general statement. With early cases there is no loss of wage-earning capacity. When the disease is more advanced about 50% of our patients have returned to their

original occupations and wages, and some 50 % have lost a varying degree of their wage-earning capacity. In the case of patients with very advanced disease, the working capacity, after discharge, is practically nil.'


There is, in short, plenty of evidence available to show that the poorer classes would benefit very largely if they had more extensive knowledge of how to buy a really satisfactory diet for a small figure, and further how to reduce the cost of their diets when necessary for financial reasons, without reducing their nutritive value.

Valuable as such information is to the working classes in health, it is of even greater importance to those who are suffering from tuberculosis.

We may safely say that unless a consumptive can manage to supply himself with a satisfactory diet, his chances of ultimate recovery, or even of maintaining a fair degree of health and working capacity, are very small indeed.

It is very essential then, that a consumptive should know how to lay out his weekly sum available for food, be it large or small, to the best advantage.

It is no use telling a consumptive working man earning 25s. a week, and with a wife and family to keep, to take three pints of fresh milk and plenty of meat and butter daily. We have often heard this counsel of perfection given in hospital out-patients' departments to a consumptive who had less than 8d. a day for the purchase of his food. Some precise information as to how he might provide himself with an adequate diet for this 8d. would be far more useful. We have in practice frequently proved the value of such advice.



Again, we have for long felt that the determination of a cheap but efficient diet for the treatment of consumption would prove of much service to institutions devoted to the treatment of the consumptive working classes.

Experience has shown us that of the total current working expenses of a sanatorium, the cost of food alone frequently amounts to some 40 %, so that an appreciable reduction in the food account would result in a material diminution of current expenditure.

From inquiries we have made of various working-class sanatoria for some years past as to the cost of their diets, we have noted that much more economy is practised in this respect at the present time than was formerly the case. It is clear from published reports that considerable care is taken to keep the cost both of food and of administration generally as low as possible. We have ourselves had a number of requests from sanatoria for information as to the best method of constructing cheap dietaries.

The results of our last inquiry are shown in the table upon the next page.

In some cases the actual diets prescribed for the patients are not given, although their cost has been determined for us. In several sanatoria, for instance at Westmoreland County Sanatorium, the sum given as the cost of the diet does not quite represent the actual cost. This is owing to various articles, such as fruit, vegetables, fowls and eggs being grown or raised on the premises, and the cost of labour, &c., entailed by this not being shown.

The cost of these various diets is shown in two different ways, viz. (1) cost of the diet prescribed to

## DIETS AND DIETETICS

WORKING-CLASS SANATORIA DIETS AND THEIR COST.  
ACTUAL DIET PRESCRIBED.

Sanatorium.	Meal.	Fish.	Milk.	Bread.	Butter.	Potatoes.	Vegetables.	Rice.	Sugar.	Bacon.	Ham.	Porridge.	Jam.	Eggs.	Cheese.	Soup.	Milk Pudding.	Cost per day in pence.	
	ozs.	ozs.	pts.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	no.	ozs.	ozs.	ozs.	d.	d.
Consumption Sanatorium, Durham	9	12	3	12	2	5½	3	1½	1	3		2						16	
Kelling Sanatorium, Holt, Norfolk	8	12	3	q.s.	2			½		3									22½
Royal National Hospital for Consumption in Ireland	q.s.		3½	q.s.	q.s.	q.s.	q.s.			q.s.				q.s.					31½
Sherwood Forest Sanatorium, Notts.	10	2	4½	q.s.	2		3			2		8	q.s.		q.s.	9	8	17	14
National Sanatorium, Bournemouth	11	7	8½	10½	2		12					3				10	10	14	
Royal Hospital, City Road			2½	q.s.	q.s.	8								2			8		11½
Daneswood Sanatorium, Beds.	15	13	3	12	5		10					1½		1	1		6		26

## PRELIMINARY REMARKS

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Bridge of Weir Sanatorium	7	5	3	5½	1	3			1½	4	2		3½	15
Royal National Hospital, Ventnor	12		2½	q.s.	1½				½	1 pt.	2		8	16
Royal Sea-Bathing, Margate (for children)	12	8	2	16	1½	8			3	q.s.	1		q.s.	9½
Sidlaw Sanatorium, Auchterhouse														21½
The Western Hospital, Torquay														15½
St. Michael's Home, Uxbridge.														13½
Westmoreland County Sanatorium *														16
Devon and Cornwall Sanatorium														12½
Maitland Cottage Sanatorium (Dr. E. Carling)													14	
Maltings Farm Sanatorium (Dr. J. Walker)													22	17
Average													14.6	17.7

\* Kitchen garden kept, which supplies large amount of vegetables. About 80-100 fowls and ducks kept.

the patients alone; (2) Cost of the diet of the patients and the staff taken together. The cost of the patients' diet is always greater than that of the dietary taken by the staff. The extra amount of milk—usually three pints daily—and the increased amount of meat and food generally taken by consumptives accounts for this. On an average, in working-class sanatoria, we calculate that the patients' diet costs from 2*d.* to 3*d.* per day per head more than that taken by the staff.

The average cost of the food taken daily by the patients and staff at the five sanatoria whose food bill has been given us in this way, works out at 14·6 pence. The average daily cost of the food taken by the patients alone at these institutions would then probably work out at about 17½*d.*

The average daily cost of the food taken by the patients alone, at the twelve sanatoria which have furnished us with this information, works out at 17·7 pence, the lowest figures being 9½*d.* (for children), and 11½*d.* for adults. The average daily cost of the patients' food at the seventeen sanatoria works out then at 17½*d.*

As a matter of interest we may note that none of the diets which we have used during our researches since 1900 have cost so much as the average cost of these seventeen diets (17½*d.*). Our most expensive diet, viz. the one taken by the patients at the Mundesley Cottage Sanatorium, cost 16*d.* per day. This sum we have steadily reduced to 11½*d.*, at which figure a thoroughly satisfactory diet can be purchased. In our opinion, where economy is of any importance, the diet for a consumptive need not and should not exceed from 12*d.* to 14*d.* per day in cost.

The saving say of 5*d.* a day per head on food (the difference between a diet costing 18*d.* and 13*d.*), in the case of a sanatorium of fifty beds would mean effecting an economy of £1 per day or some £350 a year.

Apart altogether from the question of tuberculosis, there is no doubt that a more general knowledge as to the relative value and economy of various food-stuffs would be of great advantage to the working classes and to those who work on their behalf in various ways, and again to all those whose income is somewhat limited and to whom money is an object. It goes without saying that any diet which we describe as adequate for consumptives is also adequate for an average person in normal health. The work detailed in this book then has a wide application.

These are, briefly, the main facts which led us to carry out our researches upon the construction of cheap diets.

The scope of this inquiry resolved itself into an attempt to determine the following points:—

1. The best principles upon which dietaries for consumptives should be constructed.

2. The nutritive value in terms of proteid, and total Calorie value, of the diet which is suitable for the treatment of the average consumptive: in short, a Standard Diet.

3. The best lines upon which such an efficient dietary can be economically constructed, for actual use.

4. The minimum cost at which a suitable dietary can be bought retail.

Inquiry carried out on these lines suggested a further series of observations upon:—



1. The comparative nutritive and economic values of various food-stuffs.

2. The comparative value of proteid, from animal and vegetable sources, in the dietetic treatment of consumption.

## CHAPTER II

### GENERAL PRINCIPLES OF CONSTRUCTION OF DIETS FOR CONSUMPTIVES

#### A STANDARD DIETARY.

In this chapter we shall discuss the general lines of dietetic construction which we have found to be most satisfactory for the treatment of consumption.

Our conclusions on this point have been arrived at after careful observation of several hundred consumptive patients treated upon weighed diets.

It is rather a difficult matter to define these conclusions clearly. We think our best plan is, first, to discuss briefly the general principles upon which physiological diets, namely, those suitable for people in ordinary health, are constructed, and then to describe the modifications in the physiological diet which we consider to be best suited for the treatment of consumption.

We shall take a physiological diet, in short, as our standard with which to compare the nutritive value and composition of the various diets which we have used and recommend in the treatment of consumption.

**A PHYSIOLOGICAL DIET.**

Food is taken for two main purposes, viz. to supply the necessary material for the repair of the tissues, and to give sufficient energy to meet the requirements of the body for maintaining body heat and for doing work.

**A. Repair of Tissue.**

It is characteristic of living tissue that it is constantly undergoing change. Extremely complex in composition it is constantly building into itself new substances and breaking down into less complex material—the latter, after some further modifications, being excreted from the body.

If we estimate these final excretions we can get a measure of the tissue change causing them, since a definite amount of tissue change is equivalent to a definite amount of excretory products. Practically the whole of the nitrogen from broken-down tissue reappears in the urine and can easily be estimated. We therefore take the excretion of nitrogen as the indicator of the amount of tissue change.

It has been determined that nitrogen and some other substances necessary for the life of tissues can only be supplied in the complex combination termed proteid. If, therefore, we know the amount of nitrogen an individual takes in proteid and the amount he excretes, we are able to determine how much proteid is sufficient to balance his tissue change or whether any given amount is too much or too little.

It would at first sight appear to be a simple matter to calculate the amount of proteid that should be taken

to balance the nitrogenous waste, but in practice this is not found to be so.

If an individual takes no proteid at all in his food, the amount of nitrogen excreted, which is small, might be thought to represent the amount of nitrogenous waste resulting from his tissue change under normal conditions. However, if the amount of proteid just sufficient to balance this amount of nitrogenous waste be given, it is found that the amount of nitrogen excreted is at once increased, so that the loss still exceeds the amount ingested. If now the amount of proteid ingested is progressively increased, it is found that the nitrogen excretion also increases, but more slowly, until a point is reached when the amount of nitrogen taken in the proteid just balances that excreted in the urine. The man under these conditions is said to be in nitrogenous equilibrium, and it is clear that he is taking at least enough nitrogen to balance his waste of that substance. If, however, the amount of proteid ingested is still further increased, it is found that until the amount of proteid is very large, the amount of nitrogen excreted tends to balance the amount ingested. We therefore get nitrogenous equilibrium at different levels; we have to decide at what level the patient should live to secure maximum physical efficiency.

Experience shows that a person may live on the minimum amount of proteid necessary to produce nitrogenous equilibrium for very long periods, probably for a lifetime, a fact frequently exemplified in the diets of poorly paid workmen.

On the other hand, the amount of proteid taken may be so great that its waste products are themselves


detrimental to the body and may tend to produce disease, e. g. gout, arterial degeneration, &c.

As a matter of experience it is found inadvisable to restrict the amount of proteid in the diet to that absolutely necessary for tissue repair, for a more generous supply appears to stimulate the cells of the body to greater activity, thereby increasing the immunity of the individual to disease; on the other hand the living at a low nitrogenous level is associated with lower vitality and tends to an increased predisposition to disease.

Bearing these facts in mind, various physiologists have determined the amount of proteid which should be taken daily by the average man, but since these conclusions are more the result of experience than of experiment the amounts decided upon by the various authorities differ somewhat. In the present work we shall consider the daily proteid requirement of the average healthy man to be 120 grammes.

#### **B. Requirements of the Body with regard to Energy.**

The total amount of energy required by the body for the production of heat and work, and which has to be supplied in the shape of food, varies considerably in different individuals, but before discussing this subject it is necessary to select a standard by which energy can be measured. Energy can be converted into heat, work, &c., without loss, so that in the case of foodstuffs the amount of heat which they are capable of yielding on complete combustion, may be taken as a measure of their values as sources of energy. The



requirements of the body in regard to energy may also be conveniently expressed in units of heat. For dietetic purposes we take the kilocalorie (Calorie) as our unit of heat because the ordinary unit is too small.

The amount of energy required daily varies with the individual's occupation; for example, a blacksmith puts many more foot-pounds into his day's labour than a clerk, and this difference in the amounts of energy required to do the work will be represented by a difference in the amount of energy taken in as food; in other words the man doing the harder muscular work will take the larger diet. As a matter of fact, experience teaches every man roughly the amount of energy it is necessary for him to take as food to enable him to do his work efficiently.

The amount of energy required by men doing various classes of work has been determined by calculating the Calorie value of the diets actually taken and found adequate for their different employments. The following figures represent some of the results obtained from such observations:—

**CALORIE VALUE OF DIETS FOUND TO BE EFFICIENT FOR MEN FOLLOWING  
VARIOUS OCCUPATIONS.**

A man without muscular work, e. g. a clerk . . . .	2500 to 2700
A man with light muscular work, e. g. a house-painter .	3000 to 3500
A man with moderate muscular work, e. g. a carpenter .	3500 to 4000
A man with heavy muscular work, e. g. a navy . . . .	4500 to 5000

It will be seen from the above table that the amount of energy required depends very largely upon the amount of muscular work to be done. There are other factors, such as extent of body surface, sex, climate, age, &c., which have to be considered in constructing

a scientific diet, but compared with that of muscular work, these are factors of minor importance.

We have now to decide the best method in which the required amount of energy can be supplied. Rubner has determined experimentally that one gramme of proteid is capable of yielding 4.1 Calories, one gramme of fat 9.3 Calories and one gramme of carbohydrate, 4.1 Calories.

The amount of proteid as already stated required by the body daily for tissue repair may be taken as 120 grammes; this will supply 492 Calories; the remaining energy required may be most advantageously supplied either as fat or as carbohydrate.

(Further energy can be supplied in the form of proteid, but for the reasons already referred to when discussing tissue repair such a course is undesirable.)

To a certain extent it is immaterial in what proportion fat and carbohydrate are used for the supply of the remaining energy, but since every gramme of fat supplies 9.3 Calories as compared with 4.1 Calories supplied by the same amount of carbohydrate, a diet rich in fat is of smaller bulk than one of the same value in which the energy is supplied largely as carbohydrate. The following diets are identical in value, but the bulk of No. 1 is smaller as it contains more fat:—

	<i>Proteid.</i>	<i>Fat.</i>	<i>Carbohydrate.</i>	<i>Calories.</i>
(1)	120	165	350	3500
(2)	120	100	496	3500

The following diets are examples of physiological diets having the above nutritive values:—



# DIETS FOR CONSUMPTIVES

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DIET 1.				DIET 2.			
P.	F.	C.-H.	Cals.	P.	F.	C.-H.	Cals.
120	165	350	3500 (approx.)	120	100	496	3500 (approx.)
Milk . . . . .			2 oz.	Milk . . . . .			16 oz.
Meat . . . . .			9 "	Meat . . . . .			5 "
Butter . . . . .			3 "	Butter . . . . .			1 "
Cheese . . . . .			2 "	Cheese . . . . .			2 "
Egg . . . . .			1 "	Egg . . . . .			1 "
Bacon . . . . .			2 "	Bacon . . . . .			1 "
Bread . . . . .			8 "	Bread . . . . .			16 "
Potatoes . . . . .			8 "	Potatoes . . . . .			10 "
Oatmeal . . . . .			2 "	Oatmeal . . . . .			2½ "
Sugar . . . . .			3 "	Sugar . . . . .			3 "
Jam . . . . .			1 "	Jam . . . . .			1 "
Milk pudding . . . . .			5 "	Milk pudding . . . . .			5 "
Sundries.				Sundries.			

## MODIFICATIONS IN THE PHYSIOLOGICAL DIET INDICATED BY THE EXISTENCE OF TUBERCULOSIS.

This subject has been a matter of considerable controversy during the past few years. Since the reintroduction into this country of the sanatorium treatment and its general adoption as the most efficient method of treating consumption, the feeding of consumptive patients has been a continued source of discussion.

The pioneers of the sanatorium treatment from Bodington onwards have been unanimous in stating that consumptives require to take an abundant and highly nutritive dietary, in order to repair the waste of their disease and to arrest the morbid process.

Bodington, writing in 1840, says that 'to restore a consumptive patient it will be necessary to give him frequent supplies in moderate quantities of nourishing diet and wine; a glass of good sherry or madeira in the forenoon, with an egg, another glass of wine after dinner, fresh meat for dinner, some nourishing food




for supper, such as sago or boiled milk, according to the taste or digestive powers of the patient.' So far as we are aware, the earlier writers on the sanatorium treatment did not give more precise information as to the best method of dieting consumptive patients, than that the food given must be generous in quantity and contain an abundance of fat.

In the absence of definite data, with regard to dieting, the practice of physicians in this respect has varied, and still varies very widely.

It is still very difficult to get definite data as to the nutritive value of diets prescribed to consumptives in sanatoria. Irving Fisher of Newhaven, America, collected some statistics on this point for the annual meeting of the National Association for the Study and Prevention of Tuberculosis held at Washington in May, 1906. The results of his inquiry are published in the *Transactions* of this Society (1906). Fisher states that 'Letters of inquiry were sent out to 95 of the leading sanatoria of the world of which 63 were in the United States, 2 in Canada, 13 in Germany, 11 in Great Britain, and the remainder in France, Austria, Norway, Switzerland and Russia. Very few' (less than 20 apparently), he continues, 'supplied any measured data, in most cases the statement of the food consumed was given only in a general way.' The tables giving the information which Irving Fisher obtained by his inquiry will be found in the Appendix.

In regard to the question of the quantity of food consumed, Fisher found that of 64 Sanatorium physicians, 28 were distinctly in favour of the system of forced feeding, and 29 were distinctly reactionaries



against it. In the table of measured data which will be found in the Appendix, it will be seen that the dietaries range all the way from 2100 Calories to 5500 Calories. Commenting on these facts, Irving Fisher writes: 'Naturally, not all of these standards can be correct, and if we are to believe that there is any virtue in physiological economy, we must conclude that those sanatoria which use the lowest standards consistent with weight-gaining must be more nearly on the right track.'

One point mentioned by Fisher in his paper is of distinct interest, *re* the importance of individualizing the diet. Fisher states that 'this necessity for individualizing was emphasized in many of the replies, though, oddly enough, some who most emphasized the necessity of individualizing the diet, urged it as an argument against a measured dietary. It is, of course, true that if an accurate adjustment of diet to individual needs is to be sought, even greater importance attaches to the measurement of diet than would be the case if a single diet would suffice for all patients.'

In conclusion, Fisher sums up the present position with regard to the question of the dieting of consumptives in the following words: 'There is as yet very little known with certainty as to the most efficient diet in the treatment of tuberculosis or the extent to which this diet should be individualized. In order to determine either the standard or individual diet, much study and accurate observation are needed.'

When we commenced treating patients in the consumptive wards of the Sheffield Infirmary in 1899, we were not able to find any precise directions with regard to the amount of the various food-stuffs that should be

given to consumptive patients. The diet we prescribed to our patients was, as a matter of fact, modelled on the description of the diet ordered at the Nordrach Sanatorium in the Black Forest, given by Fowler in *The Diseases of the Lungs* (Fowler and Godlee, 1898). In this book, page 393, Fowler states that 'For the following account of the Sanatorium at Nordrach, the writer is indebted to a former House Physician at the Brompton Hospital, himself a sufferer from tuberculosis and for twelve months under treatment at Nordrach'.

Dealing with the dieting of the patients at Nordrach, he states that 'one of the main features of the treatment is a regular course, from first to last, of over-feeding—stuffing would be a more appropriate term—with a rich and varied diet, including much meat, milk, fatty and farinaceous foods, given in large quantities at a time, with long intervals between the meals. Three meals are given in a day; breakfast at 8 a.m. consists of coffee, bread and butter, and cold meat, such as ham, tongue, sausage, &c., and a half litre of milk. This, after a time, was reduced to a quarter litre, according to the patient's capacity and need for putting on flesh. Dinner at 1 o'clock consists of two hot courses of meat, or fish and meat, about 4–6 oz. being served to each patient, with plenty of potatoes and green vegetables, and sauces in which butter is the main ingredient. The third course may be pastry, or farinaceous pudding, fruit and ice-cream, with coffee and a half litre of milk. Supper at seven usually consists of one hot meat course as at dinner, and one cold as at breakfast; tea, and a half litre of milk.

'The two latter meals must be taken under the super-

vision of the resident physician, and servants may not take away the plates until everything has been eaten. Roughly speaking, the patient eats about double the amount of food he desires. Pyrexia cases in bed have the same diet, with, if anything, slightly larger portions.

‘Patients are not infrequently sick during, or shortly after a meal; if this happens, they come back and finish the meal, finding, as a rule, no difficulty in retaining the remainder.’

In the absence of any records as to the exact amount of the various food-stuffs given, it is, of course, impossible to determine, even approximately, the nutritive value of the diet as just described, but it is obviously a very high one. The clinical results obtained at Nordrach at that time showed clearly enough that the use of the above diet in the treatment of consumption was attended with a considerable measure of success. From 1899 onwards a number of sanatoria were built in this country to meet the increasing demand for sanatorium treatment. The principles of treatment carried out in these institutions are abundance of open air, carefully regulated rest and exercise, and generous dieting. With regard to the dieting, the zeal often displayed in persuading patients to eat was not tempered with sufficient discretion, and the so-called generous feeding was frequently carried to an extreme point. Physicians made a point of at least being on the safe side; they made it impossible for a patient to take too small a diet, but, as a matter of fact, for the most part they left a much larger margin for safety than was necessary.

Gain of weight gradually came to be the chief aim

of the physician and the patient, and the greater and the more rapid the gain, the better pleased were both parties. Undue importance was undoubtedly attached to mere gain in body weight, and it was and is still too often assumed that continued gain in weight invariably represents satisfactory progress.

To this desire, constantly to increase the patient's weight, much of the over-feeding which has been practised in sanatoria is to be attributed. To what extent the body weight in any individual case of consumption should be increased is still a matter of opinion, but to continue to stuff a patient already two stones or so above his normal weight when in health, is physiologically unsound. Gain of weight, of course, is of considerable significance in many instances. In the case of a patient, for example, with active disease, just commencing treatment and possibly a stone or more below his normal weight, a steady gain in weight of some two pounds a week is almost invariably an indication that the patient is doing well. This is quite a different matter.

*Brief record of one of the patients treated in the Sanatorium Ward of the Sheffield Royal Infirmary in 1899.*

E. T. Age 27. Occupation:—Typefounder.

*Type of disease.*—Extensive disease of upper and lower lobes of the right lung, with excavation at the apex and infiltration of the left lower lobe.

*Duration of disease.*—Three years with periods of more or less complete arrest.

*Condition on admission.*—General health poor. Fever, 99 a.m., 100 p.m. Appetite and digestion poor.

Weight, 8 st. 5 lb., or 18 lb. below his normal weight when in good health.

This patient for the first three months of his treatment took the following diet daily:—

Milk . . . .	980 c.c.			
Bread . . . .	260 grammes			
Sugar . . . .	80 "			
Butter . . . .	42 "			
Egg . . . .	1 "			
Cooked chicken . .	120 "	P.	F.	C.-H.
Oatmeal . . . .	30 "	102	87	891
Cooked rice . . .	125 "			
Jam . . . .	70 "			
Treacle . . . .	85 "			

Nutritive value of diet.

His daily intake of nitrogen on this diet was 16·32 grammes, of which 95 % was absorbed, and 87 % reappeared in the urine. Clinically, he made some improvement, but not enough to be really satisfactory. He gained 10 lb. in weight during the first eight weeks, but remained stationary for the next four weeks at 9 st. 1 lb. His physical signs improved somewhat but his general health, though certainly better than on admission, still remained poor.

In view of his progress not being very rapid, we decided to increase his diet, and for the next three weeks he took the following daily:—

Milk . . . .	2100 c.c.			
Bread . . . .	290 grs.			
Sugar . . . .	110 "			
Butter . . . .	57 "			
Egg . . . .	1 "			
Cooked chicken . .	160 "	P.	F.	C.-H.
Oatmeal . . . .	37 "	159	150	530
Jam . . . .	58 "			
Treacle . . . .	50 "			

Nutritive value of the diet.


For three weeks he took this largely increased diet, but with very great difficulty; in short, his treatment might very well be described as 'stuffing'. He took

a very long time over his meals, and suffered from steadily increasing anorexia and dyspepsia. During the third week he commenced to vomit, and suffered also somewhat from diarrhoea. At the end of this week the large diet was discontinued.

He increased rapidly in weight during the three weeks he took this diet, gaining on an average  $4\frac{1}{2}$  lb. a week. We were able to detect no appreciable improvement in the lung condition, but his general health, especially his digestion, suffered materially. With the increased diet his daily intake of nitrogen had risen to 25.4 grammes, of which 93 % was absorbed and 58 % reappeared in the urine. There was also a marked rise in the excretion of indican, the result of intestinal derangement.

During the remainder of his period of treatment he was given a diet with a nutritive value between the two diets just described. On this diet he made satisfactory progress. He was discharged in his sixth month of treatment, with a normal temperature, and a very much improved appetite and digestion. His general health and his lung condition were also very much better. As a matter of interest, we may state that this patient resumed work as a tram conductor, and that he is at the same work and enjoying very fair health at the present time—seven years later.

This patient is of particular interest to us, inasmuch as the digestive troubles which resulted from his treatment on a large diet led us to make some observations upon the metabolism of forced feeding. These observations were not published; though incomplete, they gave very clear evidence that the digestive system and the general body metabolism were injuriously affected



by the high feeding, although the improvement in the condition of some patients—viz. arrest of the tubercular process and gain in weight and strength—might be satisfactory enough. The question then naturally arose as to whether this strain upon the digestion and metabolism was of necessity associated with the generous dieting necessary for the treatment of pulmonary tuberculosis.

*Dietetic research at Brompton Hospital (1900).*

In 1900, in association with Dr. Goodbody, we were able to carry out considerably more extensive observations upon the metabolism in cases of pulmonary tuberculosis. These observations were made upon patients who were undergoing the open-air treatment in the special open-air wards at Brompton Hospital. For the purpose of this research Dr. Kingston Fowler kindly placed one of his wards at our disposal and assisted us in selecting the patients. The purely experimental work was carried out in the Chemical pathological laboratory at University College, which enabled us to obtain the valuable advice of Dr. Vaughan Harley throughout the research.<sup>1</sup> The clinical progress and the metabolism of these patients were closely observed, and, from time to time, the various patients were prescribed three different dietaries, viz. (1) ordinary, (2) large, (3) very large.

The following are examples of what we used as ordinary, moderately large, and very large diets:—

<sup>1</sup> A full report of this research is published in vol. 84 of the *Transactions of the Royal Medico-Chirurgical Society*.



## ORDINARY DIET.

Milk . . . . .	3 pts.	Nutritive value (approximately).			
Cooked meat . . . . .	3 oz.				
Cooked bacon . . . . .	1 "				
Butter . . . . .	1 "	P.	F.	C.-H.	Cals.
Bread . . . . .	8 "	115	121	240	2590
Sugar . . . . .	1 "				
Cooked vegetables . . . . .	4 "				
Rice pudding . . . . .	5 "				

## MODERATELY LARGE DIET.

Milk . . . . .	4 pts.	Nutritive value (approximately).			
Bread . . . . .	6 oz.				
Cooked meat . . . . .	7 "				
Cooked vegetables . . . . .	4 "	P.	F.	C.-H.	Cals.
Butter . . . . .	2 "	160	179	271	3442
Cooked egg . . . . .	1 "				
Cooked bacon . . . . .	1½ "				
Sugar . . . . .	2 "				
Rice pudding . . . . .	5 "				
Grapes . . . . .	4 "				

## VERY LARGE DIET.

Milk . . . . .	5 pts.	Nutritive value (approximately).			
Cooked chicken . . . . .	4 oz.				
Cooked bacon . . . . .	2 "				
Eggs . . . . .	2 "	P.	F.	C.-H.	Cals.
Butter . . . . .	2½ "	271	281	39	5026
Bread . . . . .	11 "				
Sugar . . . . .	8 "				
Rice pudding . . . . .	5 "				
Cooked vegetables . . . . .	6 "				
Fruit (grapes and figs) . . . . .	8 "				
Somatose . . . . .	8 "				
Lactose . . . . .	1 "				

**Conclusions drawn from the Brompton work.**

The conclusions drawn from the Brompton work were as follows:—

1. The patients made very satisfactory progress both clinically and experimentally when the ordinary diets first prescribed to them were somewhat increased; in short, when treated with moderately large diets.
2. These comparatively large diets were especially

well borne by patients much below their weights. They did not give such satisfactory results in patients up to weight and with arrested disease. The patients made much less satisfactory all-round progress on the very large diets than on the diets of considerably smaller nutritive value.

3. Weight was gained in nearly every case, in some to a very large extent and very rapidly, but this gain of body weight was not associated with any more satisfactory progress in the tubercular lesion than was obtained with the smaller diets; on the other hand, general health suffered considerably, as indicated by failure of appetite, marked digestive and intestinal derangements, and in one case vomiting.

4. In spite of facts that the clinical conditions of the patients observed were widely different, and that the digestive system in at least two of the patients was obviously impaired, the digestion and absorption of both nitrogen and fat were uniformly good. This was so even in the case of patients with high fever. The absorption of fats was excellent, although very large quantities were sometimes given; e.g. with an intake of 231.3 grms., 96.4% was absorbed.

5. It was noticeable that the patients complained least of digestive discomfort on the diets that gave the best results experimentally.

6. With regard to the nitrogen. When the amount of proteid in the diet was much increased, it resulted in

(a) An increased excretion of nitrogen out of all proportion to the increased amount retained in the body.

(b) A diminution in the percentage of nitrogen excreted as urea, and consequently an increase in the

percentage amount excreted in a less oxydized form, indicating diminished nitrogen elaboration.

(c) Diminution in the percentage of nitrogen absorbed.

(d) An increase in the amount of aromatic sulphates excreted, indicating increased intestinal putrefaction.

#### **Results of forced feeding in Normal Individuals.<sup>1</sup>**

Similar observations were made upon three normal individuals all up to weight and in nitrogenous equilibrium. The results of the very high feeding in these cases were:—

1. A marked increase in the amount of nitrogen excreted.

2. A diminution in the absorption of fat.

3. No diminution in the absorption of nitrogen.

4. A rapid and large gain in weight, which was in every case associated with marked impairment of general health. The chief symptoms resulting from the overfeeding were loss of appetite, nausea, dyspepsia, drowsiness, abdominal discomfort and diarrhoea.

5. The weight gained was rapidly lost on return to ordinary feeding.

The records of the following case show very well the advantages and disadvantages of treating consumptive patients with very large diets.

<sup>1</sup> 'The Metabolism in Normal Individuals on Forced Feeding.' Bardswell, Goodbody, and Chapman, *Journal of Physiology*, 1902.

## CLINICAL HISTORY OF MISS X.

*Type of case.*—Recent and extensive pulmonary tuberculosis with high fever and the usual symptoms of acute tubercular disease.

*History.*—Previous to the autumn of 1899 this patient—who was at that time twenty-two years of age—had enjoyed good health, with the exception of a tendency to indigestion. She stated that throughout her life she had never enjoyed a good appetite. Her life had been a healthy one and spent nearly entirely in the open air. In the autumn of 1899, at a time when she was not feeling particularly well, she undertook some work in connexion with a mission in the slums of a large city. She busied herself for some three or four hours daily at this mission work, visiting the sick and poor in the slums, and also spent the whole of Sunday in similar duties. During the four months that she was engaged in this work her appetite and general health gradually became worse. It is of interest to note that during two of these four months she regularly attended a consumptive girl, who ultimately died, and who, as our patient described it, was in the habit of spitting anywhere. It was during these four months' work that Miss X's cough first commenced, but though she was feeling very unwell she did not consult a medical man. Early in 1900 she gave up the mission work on account of her increasing ill-health, but in spite of this rest she continued gradually to lose flesh and her cough became worse. In August, 1900, she definitely broke down with symptoms of acute tuberculosis. She was then very ill indeed, and her medical attendant, the first she had seen since the commencement of her ill-health, gave a very grave prognosis.

—

She had at that time extensive active disease in all three lobes of the right lung and somewhat less extensive disease in both lobes of the left lung. Her temperature ranged between 99·4 to 100·5 or 101. She suffered from night sweats; her appetite and digestion were poor. She was sent away to the country with instructions to rest and to take plenty of food. She carried out this routine for some two months, but although she gained in weight, her condition otherwise remained unaltered.

At the latter end of September, 1900, she was sent to a Sanatorium. Her condition at that time was practically the same as it was when she went into the country. Her weight at that date was 7½ st. Her average normal weight before she contracted tuberculosis had ranged between 7 st. 7 lb. and 8 st., so that on admission to the sanatorium she was not much below her ordinary weight. Her highest known weight of 8 st., however, was certainly too low for a woman of her physique. We should put her proper weight when in good health at 8 st. 7 lb. to 9 st. (her height was 5 ft. 6½ in. and her general physique was good). On admission to the sanatorium she was treated by complete rest in bed for the first three months, and was prescribed a very large diet, the following being a typical day's menu:—

*Breakfast.*

Milk, 1 quart (given in one large tumbler).

Butter, 3 oz.

Bread, 3 thick pieces measuring 1 in. x 3 in. x 4 in., approximately 6 oz. If two of these pieces were eaten it was considered satisfactory. The third piece was given to help the patient to get through the butter.

8 eggs in an omelette, or

2 thick slices of cooked bacon (1½ oz.), with an egg, or chip potatoes with either fish or bacon.

*Lunch.*

Large plate of curry, followed by roast meat about 4 oz., or the same amount of chicken.

3 large potatoes.

3 tablespoonfuls of carrots or parsnips fried in butter, occasionally varied by cabbage, &c., with thick brown gravy over all.

Milk, 1 quart. Whipped cream, 1 oz.

Pudding, bread and butter or jam pudding, &c., a large plateful.

*Dinner.*

Milk, 1 quart. Whipped cream, 1 oz.

Plate of soup. Potatoes and vegetables as at lunch.

Roast meat or chicken, 4 oz.

Bread, as at breakfast.

Butter, 2 oz.

Pudding, as at lunch.

This patient's meals were carefully supervised by her physician. The only licence she had was in the way of bread, no attention being paid to the amount of bread that she left so long as she took all her butter. The nutritive value of this diet was very high and certainly contained more than

P.	F.	C.-H.	Cals.
200	200	800	4000

Previous to becoming infected with tuberculosis and when in normal health her ordinary diet had been approximately as follows—so far as could be estimated:—

<i>Breakfast.</i>	<i>Lunch.</i>	<i>Dinner.</i>
Bacon, $\frac{1}{2}$ oz., or	Meat, 1-1 $\frac{1}{2}$ oz.	Soup.
Fish, 1 oz.	Bread, 1 oz.	Meat, bread and
Toast, 1 oz.	Milk pudding, 4 oz.	pudding as at
Marmalade, 1 oz.	Fruit, 6 oz.	lunch.
Cup of tea without	Glass of claret.	Potatoes.
cream or sugar.	Potatoes.	

*Tea.* Cup of tea only.

*At Bedtime.* Milk,  $\frac{1}{2}$  pint.

On this diet she had maintained her body weight at something between 7 st. 7 lb. to 8 st.

In our opinion, the physiological diet for this patient when in ordinary health was one with a daily nutritive value as follows:—P. 105, F. 100, C.-H. 200.

Compared with this physiological diet, her ordinary diet was certainly inadequate, but our information is not sufficient to allow us to say by how much. She was evidently in nitrogenous equilibrium with the proteid intake at a very low level, probably not higher than 70 grammes daily. The diet which she took during the earlier part of her treatment was clearly very excessive.

The results of her treatment on the very large Sanatorium diet are of much interest. She gained a pound in weight a day for the first eight days, and afterwards three to five pounds a week steadily until she at length reached a weight of 11 st. 7 lb. After three months treatment in bed her condition had very much improved, the fever had fallen to a lower range, and she was allowed to get up and begin exercise. She was a patient at this Sanatorium altogether for nine months. On discharge she was in very fair general health, the disease was quiescent (she left the Sanatorium in June, 1901). Her temperature then ranged from 99° a.m. to 99·7 p.m. Her general health was infinitely better than on admission, and she was walking four miles daily. Her weight was 11 st. 7 lb., representing a gain of four stone. She was, however, obviously too fat, and very considerably in excess of her proper body weight: she was much troubled with dyspnoea on walking. She never had an appetite, and felt heavy and sleepy all day, especially so after meals.

During the first eight weeks of her treatment, she



suffered a great deal from nausea, and this was most marked before breakfast. At the end of this period vomiting commenced; this occurred, on the average, twice a day for a day or two; it would then cease for a day or two, and recommence. Vomiting usually occurred either during a meal or immediately after.

The patient told us that such vomiting as she suffered from was the usual thing throughout the Sanatorium, and that suitable accommodation was, for this reason, provided immediately outside the dining-hall. She also had a basin sent up to her on her breakfast tray in case she was sick.

After very severe vomiting, the patients were allowed a dispensation from Sanatorium diet and given bread and milk for a time.

Three or four weeks later still she commenced to be awakened early in the morning by a feeling of nausea, which usually ended in her vomiting up a small amount of green fluid: after bringing this up, she would go to sleep again. (We subsequently had another patient under our care who had been treated by excessive feeding, and who, for months, had suffered from precisely the same condition. She also completely recovered her normal appetite and digestion, on careful dieting.)

When the body weight of Miss X had reached 11 st. her diet was reduced to practically one half. On this diet she continued to gain weight although she was already very considerably above her proper body weight. She still frequently vomited after meals, but the early morning nausea and vomiting ceased.


On her discharge from the Sanatorium she went



home for a time and then went to the south of France, where she remained until June, 1902. Not being under medical supervision, she managed her treatment herself. She took what she considered a fair diet and steadily lost weight until she had lost in all  $2\frac{1}{2}$  st. This brought her weight down to 9 st. 1 lb., a weight which we considered to be about her proper body weight. She took a considerable amount of walking exercise and improved very much in general health, and with this loss of weight the dyspnoea which she suffered from became very markedly less. In May, 1902, she was examined by a physician with considerable experience in pulmonary tuberculosis, who reported very considerable improvement in her lungs.

In the following month (June, 1902) she came back to England and spent two very hard weeks in London enjoying herself, shopping, theatres, &c. This resulted in a relapse; the disease again became active, cough increased, and she had some night sweats, she completely lost her appetite, slept badly, had some irregular fever, and generally felt very ill.

On July 4, 1902, she came under our care at the Mundesley Sanatorium. She had then physical signs of very extensive lung disease in a condition of incomplete arrest. There were signs of disease in all lobes of both lungs, which suggested a great deal of fibroid change and pleural thickening with some degree of reactivity of disease in the upper and lower lobes of the left lung; her temperature ranged from 98·5 a.m. to 99·7 p.m.; her appetite was poor, but her digestion appeared to be unimpaired, her general condition was very fair and her weight was 8 st. 12 lb.



She was prescribed rest, and the following diet:—

8 a.m.	Milk, $\frac{1}{2}$ pint.
<i>Breakfast.</i>	Milk, $\frac{1}{2}$ pint.
	Bread, 2 oz.
	Butter, $\frac{1}{2}$ oz.
	Meat, fish, &c., 2 oz.
11 a.m.	Milk, $\frac{1}{2}$ pint.
<i>Luncheon.</i>	Milk, $\frac{1}{2}$ pint.
	Bread, 2 oz.
	Butter, $\frac{1}{2}$ oz.
	Fish, 2 oz.
	Meat, 2 oz.
	Pudding, 4 oz.
	Potatoes, vegetables, q.s.
<i>Dinner.</i>	Same as at luncheon.
9 p.m.	Milk, $\frac{1}{2}$ pint.

*Nutritive value.*

P.	F.	C.-H.
130	110	210

The physiological diet for this patient when in normal health we calculated to be

P.	F.	C.-H.
105	100	200

so that the diet we prescribed for her represents an increase of 20 % in proteid and 10 % in total Calorie value.

On this diet she made excellent progress. General health and strength rapidly improved, and the signs and symptoms of lung disease rapidly became less marked. Weight was gained at a uniform rate of a pound a week for a month, when it became stationary at 9 st. 1 lb., her normal weight. By the end of this first month, her temperature had fallen to normal, and she was walking five miles daily without any fatigue. Her appetite and digestion were normal, and generally she felt better than she had done for some years. Her

subsequent progress treated on this same diet was uniformly satisfactory.


The clinical history of this patient shows very well the two methods of dietetic treatment and their results.

To recapitulate, the physiological diet for this patient, when in health, had an approximate nutritive value of P. 105, F. 100, C.-H. 200, Cals. 2180.

On the diet at first prescribed for her, with a nutritive value of certainly more than P. 200, F. 200, C.-H. 300, Cals. 4000, representing an increase of some 100 % in proteid and total Calorie value, her disease became arrested, but at the expense of her general well-being. The diet she was prescribed after her relapse, with a nutritive of P. 130, F. 110, C.-H. 210, Cals. 2420, represented only an increase on her physiological diet of P. 20 % and Calorie value 10 %, and on this diet her lung disease rapidly became arrested, and with this improvement was associated full restoration of her general health.

#### **SUMMARY OF ADVANTAGES AND DISADVANTAGES OF TREATING CONSUMPTIVES WITH VERY LARGE DIETS.**

The routine treatment of consumption with diets of a very high nutritive value is very often associated with most satisfactory clinical results, as evidenced by arrest of the tubercular process and restoration of health and strength, although this method of treatment results in a considerable strain being thrown upon the digestive system and the body metabolism. In the case of patients who have good constitutions, and especially



good digestions, continued high feeding may produce no permanent and indeed little or no temporary ill effects, except some dyspnoea due to excess of body weight. Such a patient becomes obviously too fat, often a stone or two above his normal weight, but his digestive and excretory organs successfully cope with the strain imposed upon them. On return to ordinary life, on completion of his course of treatment, such a patient loses a good deal of his excess weight and the net result is satisfactory enough. In many instances, however, and notably in the case of patients with naturally weak digestions, and in those who continue the high feeding for a long time after the normal body weight has been well exceeded, the taking of a very large diet is attended with very serious disadvantages. One of the earliest symptoms is failure of appetite, amounting to a positive loathing of food, usually associated with flatulent dyspepsia.

To impair, by over-feeding, a consumptive's appetite and digestion, is obviously as unwise a course as can be imagined. Destroy the sheet-anchor of the consumptive, his digestion, and you are doing him an irreparable injury. His chances of recovery are immeasurably lessened.

As a matter of interest, we may state that in our experience the proportion of all consumptives who have normal digestive systems when they first come under treatment is about 60 %, the remaining 40 % usually having some degree of impairment.

The following table shows an analysis of 300 of our patients in this respect:—

<i>Clinical type of Case.</i>	<i>Number of Cases.</i>	<i>Digestive Systems.</i>			
		<i>Unimpaired.</i>	<i>%</i>	<i>Impaired.</i>	<i>%</i>
Early limited disease	138	123	89.2	15	10.8
Fairly extensive and active disease	97	32	32.9	65	67.1
Chronic disease (one year and over)	65	30	46.0	35	54.0
Totals	300	185	61.6	115	38.4

This impairment of the alimentary system is often associated with a degree of dyspnoea on exertion out of all proportion to the extent of the lung disease ; this dyspnoea is no doubt due to the loss of the physiological balance between the cardio-respiratory functions and body weight. An individual in such a condition looks obviously too fat, and he, not infrequently, in addition to some degree of anorexia and flatulent dyspepsia, complains of a feeling of heaviness throughout the day, but especially marked after meals, and a general inaptitude for physical and mental exertion. If the administration of very large diets be continued after the condition just described has been established, vomiting and diarrhoea may follow, representing, as Sir Douglas Powell suggests, 'the attempts of nature to rectify our want of foresight.' The result of this is that the individual for a time at least takes a smaller diet and loses some weight, and his alimentary tract benefiting from this rest usually soon recovers its normal tone. It is to be said in favour of the system of continued very high feeding that, in spite of the discomforts and digestive disorders from which many patients suffer when thus treated, it often results in the tubercular disease becoming arrested

Excessive feeding is clearly a vastly better method of treatment than under-feeding, for it at least ensures the consumptive taking enough to repair his waste and to restore his normal power of resistance and recuperation. The point to realize is, that it is quite an unnecessary hardship for patients to be over-fed, and that it may do positive harm.

The foregoing work has demonstrated very clearly the prejudicial effects of very large diets upon consumptives, and has indicated that the most satisfactory diet is one which represents only a moderate increase upon the diet suitable for him when in normal health, but, further than this general indication, the research does not allow of our coming to any definite conclusions. The observations were not sufficiently prolonged, nor were they made upon a sufficient number of patients to allow of our formulating any definite principles as to the construction of a diet, and still less of our determining the nutritive value and composition of a standard diet suitable for the efficient treatment of the average consumptive.

At the end of the year 1900, shortly after the completion of the work at Brompton, we went into residence at Banchory sanatorium as Resident Physician and Clinical Pathologist.<sup>1</sup>

We then commenced a further series of observations with a view to determining (1) the best principles upon which to construct diets for the treatment of consumption, and (2), if possible, to arriving at a standard dietary. We may say that it is clearly impossible to

<sup>1</sup> We made a large number of dietetic and metabolic observations at Banchory Sanatorium; the results of some of these observations appear in the Dietetic Table, p. 59.

construct a dietary which is suitable for the treatment of all types of pulmonary tuberculosis and for every individual sufferer from this disease. To attempt to do so would be to attempt as impossible a task as that of constructing a dietary which would be suitable for every one enjoying normal health, irrespective of sex, age, or occupation. However, in the same way as it has been possible as the result of prolonged scientific research and observation to formulate the essential principles upon which diets for normal individuals should be constructed, so it should be possible to determine the principles upon which diets should be constructed for the use of those suffering from tuberculosis. Further, it seems reasonable to assume that by continued accurate observations upon a large number of patients, a standard diet can be determined which is suitable for the treatment of the average consumptive, and which with slight modifications, either by way of increase or decrease in some of its constituents, should be suitable for any individual consumptive.

It was on these lines that we continued our observations.

#### **Method of Observation.**

Every patient on admission was carefully examined and observed for a day or two. This enabled us to estimate the extent and activity of the disease in the lung, and to ascertain the amount of fever present, the degree of emaciation, and to some extent the general constitution of the patient, and more especially the condition of his alimentary tract. We next estimated the nutritive value of the diet which was physiological, i. e. adequate for the requirements of

the individual patient when in normal health and up to his normal weight. We then constructed a diet for the patient, in which the chief constituents of his physiological diet, viz. proteid, fat, and carbohydrate, were increased in certain definite amounts. During the course of our observations, we varied the amounts of the increase in P., F., and C.-H. considerably in different cases, and in many individual cases we observed their progress on diets of varying nutritive value.

As a matter of routine practice, we increased the physiological diets of patients in the several chief constituents, according to the degree of activity of the disease and the amount of emaciation present in any individual case.

In every instance the physiological diet for the individual patient when up to his normal weight and in normal health was taken as the basis for his sanatorium dietary. The diet as prescribed thus represented the physiological diet, with the addition of certain definite amounts of P., F., or C.-H. The diet prescribed was given to the patients in accurately weighed-out and measured amounts, and after the completion of every meal, any food-stuff that was left was also accurately weighed. By this means we obtained definite data as to the exact amount of the various foods taken by each patient throughout the whole course of treatment.

Careful clinical observations were also made with regard to the progress of the lung disease, alterations in body weight, improvement in general health, &c., and, in many cases, metabolic examinations were also made.



## CHAPTER III

### GENERAL PRINCIPLES OF CONSTRUCTION OF DIETS FOR CONSUMPTIVES (CONTINUED)

#### SUMMARY OF THE RESULTS OF OUR OBSERVATIONS MADE UPON 200 CONSUMPTIVE PATIENTS TREATED UPON WEIGHED DIETS.

As a result of a long series of such observations, we have come to the conclusion that the following are sound principles upon which to construct dietaries for the treatment of patients suffering from pulmonary tuberculosis.

#### **General Principles for the Construction of Diets for Consumptives.**

1. The physiological diet (viz. the diet which contains the exact amount of carbon and nitrogen necessary to balance the amounts of these substances excreted) for every individual when in normal health and at physiological rest<sup>1</sup> should first be ascertained, and this physiological diet should form the basis of the diet prescribed for treatment.

<sup>1</sup> Physiological rest = when not engaged in muscular work.

2. The amount of proteid in the physiological diet should be increased by 30 %, and this increase should be maintained until the disease is obsolete.

3. If the patient is under weight, the physiological diet should also be increased 30 % in the energy value either in the form of fats or carbohydrates, or partly, in each. This increase should be maintained until the weight becomes stationary at a point a few pounds in excess of the patient's highest known weight before becoming infected with tuberculosis. *(I should prefer*

*at about the proteid normal weight  
age, family habit, environment &  
occupation considered.)*

A decrease of 15 % may then be made, and the diet, thus altered, should be continued until the disease is obsolete.

4. The meals must not be too bulky, especially in the case of patients with poor digestions, but rather inclined to concentration, so as to give the comparatively large amount of nourishment in a but slightly increased bulk of food-stuffs.

In the case of the consumptive working classes, this last principle does not apply, since they are accustomed to taking diets of large bulk.

5. The meals should be given at considerable intervals. They should be well cooked and as varied as possible.

*Quint*

#### **The Relative Value of Proteid, Fat, and Carbohydrate in the Treatment of Pulmonary Tuberculosis.**

The increase of 30 % in the daily amount of proteid which we recommend is, in our opinion, an important dietetic indication in the treatment of consumption.

We have evidence which suggests that patients when treated upon diets containing a large amount of fat and carbohydrate, but with little or no corresponding increase of proteid, do not do so well as those patients whose daily intake of proteid is also appreciably increased.

With regard to an increase of fat and carbohydrate, the increase in the amount of the energy-giving foods, though desirable in nearly every case, is probably of less importance than the increase in proteid. The increase we recommend in the amount of proteid and in the Calorie value of the physiological diet of any patient is sufficient in our experience to restore weight at the rate of some two pounds a week and to secure very good clinical results. The 30 % increase of proteid which is indicated in every case in itself represents an increase of some 7 % in the total Calorie value of the diet. The remaining 23 % increase indicated for the treatment of the disease can be given either in the form of fat or carbohydrate.

**Practical Illustration of the Application of the  
Principles of Dieting just described.**

Supposing we have to deal with a consumptive man of average physique, 5 ft. 6 in. in height, weighing, when in normal health, about 10<sup>(140 lb)</sup> st., a clerk by occupation, with recent and somewhat extensive infiltration, involving both lungs with some fever, a considerable degree of emaciation, probably some 18 lb. below his normal weight. We know that a diet of the following

value was physiological or adequate for him when in normal health:—

P.	F.	C.-H.	Cals.
120	110	250	2540

For his treatment we should increase this diet 30 % in its proteid value and 30 % in its total Calorie value. The diet would then have the following nutritive value:—

P.	F.	C.-H.	Cals.
155	160	275	3250

It is important to remember that in every case the bases for our consumptive dietaries are the diets which are physiological for various individuals when in normal health and at physiological rest, i.e. not engaged in muscular work. When at work, a navvy weighing about 10 st. requires a diet of much larger Calorie value than a clerk of the same weight, but when at rest the diet of the clerk would do for both of them. The diet then which we would prescribe to both these individuals if they became consumptive would be the same, viz. one containing 155 grammes of proteid and 3250 Cals. A diet of this nutritive value is represented by the following:—

	<i>Amount</i> (oz.).	<i>Proteid.</i>	<i>Fat.</i>	<i>Carbo- hydrate.</i>
		gms.	gms.	gms.
Milk	60	57	70	87
Bread	6½	16	2	88
Butter	1	—	32	—
Cream	1	1	6	—
Fish	4	20	10	—
Meat	6	44	22	—
Milk pudding	4	} 9	16	50
Suet or sponge pudding	3		—	—
Potatoes	5	1	—	30
Egg	one	6	4	—
Stewed fruit, green vegetables, soups, &c., from time to time	q.s.	1	1	7
Cake	1	1	2	12
Totals	—	155	160	275

Total Calorie value 3250

In the above table the values of the various food-stuffs are calculated from the tables of percentage composition of Atwater (U.S. Department of Agriculture, Bulletin 28) and in the case of the cooked foods from original figures. No allowance is made for bone in the above amounts; e. g. the 6 oz. of meat contains no waste, and the 2 oz. of fish is without bone or skin.

This dietary, in practice, may be conveniently given in the following way:—

#### DAY'S MENU.

##### *Breakfast.*

Milk, 1 pint (usually coffee added to flavour), 2 breakfast cupfuls.

Toast, 2 fairly thin slices, or 4 of the ordinary triangles.

Butter, ½ oz. A piece the size of a large walnut.

An egg.

Some meat, 1 oz. An ordinary-sized helping; or a herring.

If porridge were taken it would not be necessary to take so much toast.

11 a.m.

½ pint of milk. A tumblerful.

*Lunch.*

Milk,  $\frac{1}{2}$  pint. A tumblerful.  
Bread, 2 oz.  
Butter,  $\frac{1}{2}$  oz.  
Fish, 2 oz. or an ordinary-sized helping.  
Potatoes,  $2\frac{1}{2}$  oz. Two potatoes the size of an egg.  
Green vegetables and stewed fruit in ordinary amounts, if liked.  
Meat,  $2\frac{1}{2}$  oz. A large helping, but varies much in appearance according to the variety.  
Milk pudding, 5 oz. Half a tumblerful or a good plateful.

*Tea.*

Tea, a slice of thin bread and butter (1 oz.) and a piece of cake (1 to  $1\frac{1}{2}$  oz.).

*Dinner.*

Milk,  $\frac{1}{2}$  pint.  
Bread, 2 oz.  
Butter,  $\frac{1}{2}$  oz.  
Fish or entrée, 2 oz.  
Soup, green vegetables, and dessert in ordinary amounts, if liked.  
Meat,  $2\frac{1}{2}$  oz.  
Boiled pudding, 3 oz. A good helping.  
Potatoes,  $2\frac{1}{2}$  oz. Two potatoes the size of an egg.

*At Bedtime,*  $\frac{1}{2}$  pint of milk.

If the above dietary is compared with that taken by the average man in ordinary health, it is seen that there is no very great difference between them; the addition of some two pints of milk is perhaps the most noticeable feature. It is essential, of course, that the diet be varied and well cooked. We may note here that the diet just given was constructed primarily for the use of consumptives belonging to the more leisured classes, and, in consequence, requires modification before being given to consumptives belonging to the working classes. The working classes have different habits with regard to their meals than the leisured classes, and it is most important that

these habits should be taken into consideration when dealing with them.

The general principles which we have just described and which we have found to be a very satisfactory basis upon which to construct diets for the treatment of individual consumptives, are perhaps not sufficiently simple for general application. Especially when dealing with a large number of consumptives, for instance in a large sanatorium, it is a somewhat long business in practice to work out the diet for every individual in this way, and to give the exact amounts determined upon. For routine everyday work, a standard diet suitable for the average consumptive which can be modified for individuals is clearly much more satisfactory.

To arrive at such a standard diet, we have worked out the average nutritive value of the diets taken by a number of our patients who made very satisfactory recoveries. The results of this analysis are shown in the tables opposite, Groups I and II.

From the records there given, it is seen that the average of these forty-nine diets represents a dietary with the following nutritive value:—

P.	F.	C.-H.	Cals.
150	150	250	3000 (approx.)

A diet, then, of the above nutritive value, may be taken as a good standard diet for the treatment of the average consumptive man. We have used this as our standard dietary during the past four years and found it to be most satisfactory.

At the King Edward VII Sanatorium the routine dietaries have been framed on the above standard.

# LIVE PATIENTS.

	After-History.
gra- s gic.	
mal	<p>Normal health, at work after 6 years. Died of Aneurysmal Haemorrhage after 2 years.</p> <p>Normal health, at work after 5 years.</p> <p>" " "</p> <p>Fair health, at work after 6 years. Lost sight of, normal health after 2 years.</p> <p>Normal health after 3½ years. In Sanatorium only 6 weeks, continued treatment at home.</p> <p>Normal health, at work after 8½ years.</p> <p>Normal health, at work after 4 years.</p> <p>" " "</p> <p>" " "</p> <p>" " "</p> <p>Fair health after 6 years.</p> <p>Normal health after 5 years.</p> <p>" " " at work.</p> <p>" " " 4½ years.</p> <p>Quite well after 4½ years, at work.</p> <p>" " "</p> <p>" " 5 years.</p> <p>Lost sight of.</p> <p>Good health after 4 years.</p> <p>" " "</p> <p>Good health for 2 years. Died of tubercular enteritis.</p> <p>Good health after 4 years.</p> <p>" " "</p> <p>Normal health after 4 years, at work.</p> <p>Died of Acute Lobar Pneumonia.</p> <p>Resumed work as Officer in the Army. Perfectly well when last heard of.</p>



	<i>After-History.</i>
<i>Temperature Range.</i>	
9°-99.8°	Returned to work. Died one year later.
8°-99.4	" " " "
Normal	" " " "
"	Fair health after 4 years.
"	Normal health after 6 years.
.4°-99.4°	At work when last heard of.
Normal	" " " "
98°-99°	Excellent health, and at work after 2½ years.
	In good health when last heard of.
98°-99°	Quite well after 6 years.
98°-99°	Returned to work. Died 2 years later.
Normal	Lived 8½ years.
"	Died 18 months later.
"	Good health when last heard of (in California).
"	Good health after 2 years.
"	Good health, and at work after 4 years.
"	Developed general tuberculosis and died 1½ years later.
"	Fair health, and at work after 8 years.
"	" " " "
.6°-99.6°	Died 2 years later.
Normal	" "

# DIETS FOR CONSUMPTIVES

59

STANDARD DIETS IN USE AT THE KING EDWARD VII SANATORIUM.

	MEN		WOMEN	
7.30 a.m.	MILK*	$\frac{1}{2}$ pint	MILK*	$\frac{1}{2}$ pint
	BREAKFAST		BREAKFAST	
	PORRIDGE (with milk)	$\frac{1}{2}$ pint	PORRIDGE (with milk)	$\frac{1}{2}$ pint
	Egg	1 ( $\frac{1}{4}$ days a week)	Egg	1 ( $\frac{1}{4}$ days a week)
	MEAT (A), &c.	2 oz.	MEAT (A), &c.	1 $\frac{1}{2}$ oz.
	BREAD	2 oz.	BREAD	1 $\frac{1}{2}$ oz.
	BUTTER	$\frac{1}{2}$ oz.	BUTTER	$\frac{1}{2}$ oz.
	Tea, coffee, marmalade, &c.	q. s.	Tea, coffee, marmalade, jam, &c.	q. s.
12 noon	MILK*	$\frac{1}{2}$ pint	MILK*	$\frac{1}{2}$ pint
1.15 p.m.	LUNCHEON		LUNCHEON	
	MEAT (B)	3 oz.	MEAT (B)	2 $\frac{1}{2}$ oz.
	PUDDING (suet or milk)	5 oz.	PUDDING (suet or milk)	3 oz.
	BREAD	2 oz.	BREAD	1 $\frac{1}{2}$ oz.
	BUTTER	$\frac{1}{2}$ oz.	BUTTER	$\frac{1}{2}$ oz.
	MILK	$\frac{1}{2}$ pint	MILK	$\frac{1}{2}$ pint
	Potatoes and vegetables, or salad	q. s.	Potatoes and vegetables, or salad	q. s.
	Stewed fruit, jam, &c.	q. s.	Stewed fruit, jam, &c.	q. s.
	Cheese and biscuits	q. s.	Cheese and biscuits	q. s.
4.30 p.m.	TEA (optional)		TEA (optional)	
	Tea, bread and butter, sandwiches or cake	q. s.	Tea, bread and butter, sandwiches or cake	q. s.
7.15 p.m.	DINNER		DINNER	
	Soup or fish (optional)		Soup or fish (optional)	
	MEAT (C)	3 oz.	MEAT (C)	2 $\frac{1}{2}$ oz.
	PUDDING (milk or suet)	5 oz.	PUDDING (milk or suet)	3 oz.
	BREAD	2 oz.	BREAD	1 $\frac{1}{2}$ oz.
	BUTTER	$\frac{1}{2}$ oz.	BUTTER	$\frac{1}{2}$ oz.
	MILK	$\frac{1}{2}$ pint	MILK	$\frac{1}{2}$ pint
	Potatoes and vegetables	q. s.	Potatoes and vegetables	q. s.
	Stewed fruit, jam, &c.	q. s.	Stewed fruit, jam, &c.	q. s.
	Cheese and biscuits	q. s.	Cheese and biscuits	q. s.
9.30 p.m.	MILK	$\frac{1}{2}$ pint	MILK	$\frac{1}{2}$ pint

**N.B.**—The weights given are the minimum quantities which patients are prescribed; second helpings of meat, pudding, and butter are allowed if asked for.

\* Milk is not given both at 7.30 a.m. and 12 noon, but it is left to the patient's choice at which time it is taken.

**MEAT (A).** At breakfast, on different days of the week one of the following is provided :—

Bacon, ham, fish, tongue, or sausage.

**MEAT (B).** At lunch, consists of one of the following :—

Roast or boiled beef, hot or cold.

Roast or boiled mutton, hot or cold.

Beefsteak and kidney pudding, stewed steak or Irish stew, or liver and bacon.

Chicken, roast lamb, veal, or pork occasionally.

**MEAT (C).** At dinner, consists of one of the following :—

Hot roast or boiled beef, hot roast or boiled mutton, hot roast lamb.

The compulsory diets which are printed in small capitals, and which are prescribed in weighed and measured amounts, as shown in the table, give diets of the following nutritive values :—

**MEN.** Proteid, 144 gms.; fat, 160 gms.; carbohydrate, 270 gms.; Calories, 3186.

**WOMEN.** Proteid, 126 gms.; fat, 160 gms.; carbohydrate, 220 gms.; Calories, 2814.

Various modifications in this diet are made for individual patients, and in the cases of the majority of patients who are confined to bed. The chief difference from the standard diet for febrile patients is made in the meat at lunch and dinner, where in place of the 3 oz. of meat, the patients are given 3 oz. of fish (boiled or fried), and 3 oz. of either sweetbread, chicken, fillet steaks, chops, cutlets, mince, or occasional joint. Again, their puddings are varied more than is the case with patients who are taking their meals in the dining-hall, junket, custards, jellies, &c., taking the place of suet and milk puddings.

At Coppin's Green Sanatorium for men, some of whom are engaged at work in the gardens, the standard diet is somewhat higher in nutritive value, viz :—

P.	F.	C.-H.	Cals.
153	115	463	3616

The construction of this diet will be referred to fully in a subsequent chapter (p. 150).

These standard dietaries, which are modified for individual requirements have proved entirely satisfactory in every respect.

It is of interest to compare our standard diets with the average described by Dr. H. M. King as taken by twelve typical consumptive patients at Loomis Sanatorium. In his paper, 'Diet in Tuberculosis,' published in the *Transactions of the National Association for the Study and Prevention of Tuberculosis* (Washington, 1906), King thus describes his observations:—

'With a view of establishing a working standard—so to speak—for certain classes of tuberculous invalids, the following experiment was recently made at the Annex of the Loomis Sanatorium. Twelve patients, equally divided as to sex, were selected, with reference, first, to similarity of pulmonary conditions, all but one with quiescent or arrested lesions, and that one with but a very moderately active lesion; second, with reference to similarity of weight, the men represented in the table following from 1 to 6, inclusive, averaging 11 or 12 kilos more than the women, represented in the tables by the numbers 7 to 12 inclusive; and, third, with reference to a close approach of each patient to his or her normal weight. It will be noticed that in all but one case, the patients were slightly below the indicated standard. Nevertheless, the appearance was that of a very well nourished group of individuals. These patients were placed at a table by themselves, and their food, while not differing from that of the other patients, either in quality or quantity, was accurately weighed and recorded for a period of fourteen days.'

TABLE OF KING'S OBSERVATIONS.  
AVERAGE DAILY FOOD ALLOWANCE.

Case No.	Pulmonary condition.	Pulse Range.	Temperature Range.	Daily Exercise.	Albumen.	Fats.	Carbo- hydrates.	Total Calories.	Calories per kilo.	Normal weight, kilos	Weight before, kilos	Weight after, kilos	Gain, grms.	Loss, grms.	Excretions.		
															Urine, c. c.	Sp. Grav- ity.	Total Solids.
1	Disease arrested	92-120	97.2°-98.4°	2 hrs.	215.83	241.47	442.01	4940.76	80.89	64.318	61.462	61.808	340		1950	1.014	63.60
2	Quiescent	96-108	97°-99°	2 hrs.	138.24	141.68	289.12	3061.60	47.95	68.679	63.844	63.957	113		1200	1.020	55.92
3	"	76-96	97.4°-98.8°	None	198.54	215.72	311.54	4097.52	62.13	80.287	65.881	66.565	1347		2100	1.016	78.28
4	"	80-104	96.6°-100.6°	4 hour	149.95	168.64	293.42	3396.17	52.48	71.968	64.524	64.638	114		1800	1.016	67.10
5	Disease arrested	76-92	97.4°-98.6°	2 hrs.	189.58	236.56	357.49	4443.00	65.98	68.947	70.875	71.668	768		2700	1.014	88.07
6	"	84-100	98.4°-99°	None	188.90	201.71	336.89	4011.14	64.07	62.596	62.596	63.617	1021		1800	1.020	83.88
7	"	84-108	97°-98.4°	1 hour	158.66	199.80	328.64	3851.42	76.84	53.524	50.122	51.597	1475		900	1.020	41.94
8	Quiescent	84-96	96°-97.6°	1 hour	164.76	118.44	344.13	3187.94	59.56	56.600	53.524	54.885	1361		1950	1.012	44.52
9	"	96-120	97°-99°	None	125.19	129.81	281.43	2649.88	54.84	61.286	48.308	48.862	451		1350	1.016	50.32
10	"	80-108	96°-98.6°	1 hour	197.85	217.88	412.27	4527.78	83.88	54.885	53.978	54.772	794		900	1.018	87.84
11	Moderately active	72-120	98.4°-100.4°	None	177.72	184.61	310.29	3717.71	76.60	55.889	48.535	49.215	680		1500	1.014	48.98
12	Quiescent	72-128	98°-99.2°	None	95.20	96.27	206.98	2134.25	44.08	59.875	49.421	47.741		680	1300	1.015	41.94
	Average 12 patients 14 days				166.08	179.34	322.02	3687.39	64.06				763				53.49

Commenting on this table, King states that 'This dietary has seemed to us to meet, in a fairly satisfactory manner, the requirements of the class of tuberculous invalids treated in the Annex division of the Loomis Sanatorium. Nevertheless, I felt that the proteid constituent of the dietary has been in excess of the tissue needs, and, if so, that an unnecessary, and perhaps harmful tax was thus imposed upon the organs concerned in proteid metabolism and elimination.'

The diet taken by King's patients at the Loomis Sanatorium is somewhat larger than our standard diet, both in proteid and Calorie value, the average daily intake of proteid in King's diet being 166 grammes, compared with 144 grammes in our standard diet.

Standard diet.	P.	F.	C.-H.	Cals.
Bardswell and Chapman	144	160	270	3186
King	166	179	322	3667

The following letter from King, criticizing the above figures, is of interest:—

'The question of establishing the minimum proteid food constituent which would give a plus nitrogen balance in cases of tuberculosis is of much interest to me, and without being able to give figures which can substantiate my belief, I am still of the opinion that in a certain proportion of selected cases at least, we can reach better results by reducing the proteids to from 75 to 100 grammes and correspondingly increasing the carbohydrates and, to a less extent, the fats, to total about 45 to 50 Calories per kilo of body weight. I have not, by any means, reached satisfactory conclusions on this subject, on which I am still working, and which was first brought to my attention by the work you

reported in connexion with Goodbody and Chapman several years ago while working at the Brompton Hospital.

‘For the present, the average diet which we find for practical purposes most useful is almost identical with that which you quote as having been found most satisfactory with you, except that we probably average a greater consumption of carbohydrates, bringing the total Calories to from 3,000 to 3,700.

‘HERBERT MAXIM KING,

Physician in Chief,

Loomis Sanatorium,

New York.

*August, 1907.*

## CHAPTER IV

### THE COMPARATIVE ECONOMY OF THE CHIEF FOOD-STUFFS

In this chapter we propose considering what we may term the economic efficiency of the various food-stuffs.

When we discuss the cost of dietaries, we shall show that their economic efficiency cannot be correctly judged simply by the cost, and that there are other factors, such as palatability, suitability to the specific purpose, &c., which have to be taken into account in arriving at a conclusion. In the same way, when estimating the economic efficiency of the various food-stuffs, we do not form our decision from the price alone, but take into consideration such factors as the amount of proteid and the Calorie value that can be bought for a fixed sum, the palatability, digestibility, and the completeness of absorption, and the amount of labour and other expenses required in the due preparation for the table.

The cost of a food-stuff varies with its palatability rather than with its nutritive value. The costlier a food the greater its palatability; e.g. Stilton and American cheese have practically the same composition, yet the former costs perhaps 1s. 2d. per pound and the latter 7d., the sole difference being in the flavour. We pay, in fact, for flavour, not for nutritive value.

The digestibility and completeness of absorption have



a direct bearing upon the efficiency of a food, for it may be absolutely detrimental to use a food, however high its nutritive value, which causes dyspepsia in a given case, or which is incompletely absorbed.

The cheaper and less palatable foods require, as a rule, a good deal of trouble in preparing them for use, and frequently the process of cooking is so tedious that the firing used may have an appreciable effect upon the actual cost. In any case, the impossibility of devoting sufficient time to the cooking, as in the case of the poor, whose wives already have often too much to do, quite prevents the cheapest foods being used to their full extent without loss of nutritive efficiency.

### Milk.

#### *Average Composition.*

	<i>Proteid.</i>	<i>Fat.</i>	<i>Carbo- hydrate.</i>	<i>Calories.</i>
New milk . . . . .	3.3	4.0	5.0	71
Separated milk . . . .	3.3	.8	5.0	37
Buttermilk . . . . .	3.0	.5	4.8	37

If we take average retail town prices we see the following nutritive values of the various varieties of milk that can be bought for each penny:—

	<i>Price.</i>	<i>Amount bought per penny.</i>	
		<i>Grammes Proteid.</i>	<i>Calories.</i>
New milk . . . 1s. 4d. per gallon		9.4	202
Separated milk 6d. per gallon		25	280

The great difference between the prices of milk and separated or buttermilk, is due to the fact that there is a great demand for cream and butter as palatable articles of diet. For the remainder, i.e. the separated milk or buttermilk, being relatively cheaper, there is little demand, hence the low price. As a source of

cheap proteid, separated milk ranks midway between the meats at the one extreme and the pulses at the other, and is three times as cheap for this purpose as whole milk. As a source of energy it ranks above that to be obtained from the whole milk that can be bought for the same money.

It must be admitted that whole milk is much more palatable than separated (or skimmed) milk, but, at the same time, separated milk, as a drink, is by no means so unpalatable as to contra-indicate its use. The main use, however, to which we recommend that separated milk should be put to is in cooking.

In puddings it is impossible to distinguish those made with whole milk from those made with separated milk.

Again, separated milk can be used advantageously in making cocoa, oatmeal porridge, and, in general, most articles which require milk.

It may be said that the use of separated milk, which is confessedly of lower nutritive value, bulk for bulk, than whole milk, lowers the nutritive value of the diet. This is, of course, quite true, but it is of little or no importance to the healthy man who can make up the deficiency easily enough in other ways. In the case of persons with poor appetites, the fat lost by separation can readily enough be restored by the use of an equivalent amount of margarine, which for cooking purposes is quite as satisfactory as butter and less expensive. A gallon of whole milk loses 168 grammes of fat by the process of separation. At the prices we have assumed the milk to cost, this 168 grammes of fat costs 10d. One hundred and sixty-eight grammes of fat, in the form of the best margarine,

costs about 4*d.* In other words, we save 6*d.* per gallon if we use separated milk and margarine in place of whole milk without affecting the nutritive value in the slightest degree nor yet the palatability, provided the materials are used for cooking only.

These economic properties of milk, though not generally made use of, appear to us to be worthy of the consideration of those responsible for the construction of dietaries for the working classes and for public institutions.

#### **Butter, Margarine, &c.**

Butter is a very palatable form in which to take fat; it is in considerable demand among the well-to-do, and in consequence is relatively expensive.

Butter is found on the market in two forms, (1) as English fresh butter, which contains little or no salt, and (2) as imported foreign butter, to which a considerable amount of salt has been added to preserve it. The former is much the more palatable and has a correspondingly higher price.

Margarine and butter have practically the same nutritive value, or if there is any difference, it is in favour of the margarine, which contains rather less moisture as a rule. Each contains roughly 80 % of fat.

Both substances have approximately the same melting-points and their absorption by the intestine is equally complete. The chief difference between them is in their flavours.

With respect to flavour, the advantage is on the side of butter, supposing the latter to be of good quality, but on the other hand margarine of good quality is by no means unpalatable, and in our experience is preferred

by patients to the cheap salt butter which so many of them get at home.

When used in cooking the advantage is greatly in favour of margarine, which is drier. It makes quite as good pastry, &c., as butter, and with greater ease. It however cannot be used for frying purposes. Articles made with margarine are in flavour indistinguishable from those made with butter.

From an economic point of view, margarine is very much to be preferred to butter, since the best quality of margarine costs only 8*d.* per lb., while fairly good butter certainly averages at least 1*s.* throughout the year, thus saving 4*d.* per lb. This saving is effected without altering the nutritive value of the diet.

For economic dietaries we recommend that margarine should be used for all cooking. Whether butter or margarine is used for table purposes will depend solely upon the amount of economy it is necessary to practise in any particular dietary.

#### **Suet.**

Suet contains on an average 80 % of fat, and costs about 6*d.* per lb. It is probably the cheapest source of animal fat in common use, with the exception of dripping, and is very completely absorbed by the intestines. It may be used in an economical dietary to supplement dripping in the making of various boiled puddings when the supply of the latter is too small. There are numerous clarified and water-free suets in the market, which are composed almost entirely of fat and keep indefinitely. They are rather more costly but are economical where suet is required in small quantities

only, as, unlike ordinary suet, there is no risk of their becoming stale before they are completely used.

#### **Dripping.**

Dripping is probably the cheapest form of animal fat, and as such is largely used by the poor. It may be used to replace butter with bread, which effects a considerable saving. It is invariably relished by children. It also replaces suet in boiled puddings with great advantage, as it makes them lighter. The flavour, too, by many is preferred. In every household where economy is studied—in fact, we may say that in every well-regulated household, full use of dripping should be made, both in cakes and puddings, and in frying. The cook should never be allowed to take it as a perquisite. There is often the strange anomaly of good wholesome dripping being sold by the cook at the back door, to be replaced by lard of very inferior description from the shop.

#### **Vegetable Fats.**

There are numerous fats of high and low melting-points, which, from a nutritive standpoint, can replace butter and suet in cooking, and which are cheaper, but as they are mostly proprietary articles and not generally available, for this reason we shall not consider them.

#### **Meat.**

It would take so many pages to discuss adequately the comparative economy of the varieties of meat, that we shall content ourselves with a brief sketch of the chief points of interest.

1. Meat is used in dietaries primarily as a source of proteid, the fat, as we shall endeavour to show, being

of secondary importance. At first sight it might seem that as meat is the most expensive form in which we can take proteid, its use could not be justified in economical dietaries. Further consideration, however, shows that it adds so much to the palatability of the diet and is such a convenient way in which to take proteid, that, even if it were not customary to take meat regularly, its inclusion in cheap diets would be justified.

Meat fat is not particularly appetizing to the average person, who would much prefer the less costly and more palatable butter, but when we see that we must take our meat proteid in combination with either a good deal of water or with a considerable amount of fat and some water, it is clearly more economical to take some fat with our meat proteid.

The following comparison of the values of the same joints from lean and fat cattle shows that in great measure the fat replaces some of the water of the lean joint.

	<i>Water %</i>	<i>Proteid %</i>	<i>Fat %</i>
Ribs of beef (very lean) edible portion	70.9	25.0	3.5
" " (very fat) " "	45.9	14.6	38.7

It will be seen that although there is less proteid in a fat than in a lean joint there is also much less water. Fat in fact takes the place of some of the water found in the lean joint. We certainly do lose some proteid by taking a fat joint, but at the same time we are more than compensated by the great increase in the amount of fat without extra cost.

If the fat is present in very excessive amount, the proteid present becomes so small that the joint is no longer economical as a source of proteid, but if it can be produced cheaply enough it becomes of service as

a source of fat. Now the expenses of raising beef and mutton are so considerable that they cannot compete with butter, &c., as sources of fat. The farmer therefore does not fatten his sheep and bullocks excessively. On the other hand, the pig can be raised at comparatively small cost, and its fat can successfully compete with butter and other fats: the farmer therefore places no limit to the extent to which he will fatten pigs. The composition of bacon shows to how great an extent the proteid may become reduced in the presence of much fat.

	<i>Water %</i>	<i>Proteid %</i>	<i>Fat %</i>
Bacon, edible portion (lean). . .	31.8	15.5	42.6
„ „ (fat) . . .	18.8	9.9	67.4

The conclusion we derive from the foregoing is that the moderately fat joints are the most economical, for the lean ones have too much water present and the very fat ones too little proteid.

2. Meat from young animals, such as veal and lamb, is necessarily more expensive than meat from fully grown animals, for the expenses of raising are the same in both cases, but the farmer must make his profit in the case of the immature animal upon a much less bulk of meat than in the case of the fully grown sheep or bullock. Meat from young animals yields a smaller amount of nutriment for a given sum than fully matured meat, and is never economical.

3. Meat which has been cut off in the preparation of joints—'trimmings'—has a ready market among the poor, and is the most economical way in which meat can be obtained. Such trimmings bought late on Saturday night when the butchers are selling their remnants, at any price they can get, is not infrequently

the sole variety of fresh meat in the dietaries of some of our very poor.

4. The cost of production of beef and mutton is so great in England—the reasons we need not here consider—that it has been found profitable to import meat in a frozen condition from countries where it can be produced at a minimum cost, for example, mutton from New Zealand and beef from America. Such meat can be bought in England for at least 25 % less than English meat in spite of the great expense entailed in carriage in special ships from the country of origin. This does not, however, mean that the purchaser really saves 25 % by using such meat, for the joints are smaller than the corresponding English joints, with a consequent increase in the amount of waste (bone, &c.). The meat also is generally much leaner than home-grown meat, which again tends to make it less economical. If we make the fullest allowance for these factors we find that the saving is still considerable. When carefully treated and thawed slowly, the flavour of such joints is not, in our opinion, appreciably inferior to that of English meat, and the time the meat has been hanging ensures tenderness. Butchers of whom we have made the inquiry, tell us that the larger-sized joints, especially those of American beef, are not infrequently sold as home-grown meat on account of their tenderness.

5. The great expense incurred in bringing foreign meat into the English market in a frozen condition necessarily makes the cost to the buyer very much in excess of the price in the country of origin. If these expenses are greatly lessened by preparing the meat in the country of origin, so that it can be packed and



exported as ordinary merchandise, the cost to the buyer in England is much decreased. In fact he will buy his meat at the least possible additional expense (determined by the cost of preparation and carriage) over its cost in the country of origin, where meat is very cheap. Meat cooked and canned in the country where it is produced, fulfils these requirements, and is the most economical form in which to buy meat. The following figures show how great a saving can be effected by the use of tinned meat:—

	Price per lb.	Composition.		Grammes per lb.	
		Proteid.	Fat.	Proteid.	Fat.
English beef . . .	9d.	19.0	19.0	9.5	9.5
Foreign beef . . .	7d.	19.0	14.0	12.1	9.0
Tinned beef (cooked)	6d.	25.9	14.8	19.4	11.0

Although there is great economy in using tinned meat we do not feel justified in recommending its use except occasionally. In certain institutions for able-bodied men, tinned meat is used two or three times a week with considerable advantage to the economy of the establishment.

With regard to the comparative economy of the various joints of beef, mutton, and pork, the joints into which the animals are divided vary to some extent with the locality, and the prices differ still more with local conditions. We shall now refer to the prices obtaining in London for joints of prime English beef and mutton. We may state that London prices differ considerably from the prices for the same things in other parts of the country. Still the general principle laid down for London holds good any and everywhere, a shoulder, for instance, will always be worth less than a leg—and so on.

Our remarks as to the relative economy of the various joints have a general application.

**Beef.**

The following table shows the percentage composition of the various joints, the London average retail price per lb., and the nutritive value that is obtained for every penny spent:—

	<i>Cost per lb.</i>	<i>% Composition.</i>		<i>Nutritive value per 1d.</i>		
		<i>Refuse.</i>	<i>Proteid.</i>	<i>Fat.</i>	<i>Proteid.</i>	<i>Fat.</i>
Neck . . . . .	5d.	81.2	14.2	9.2	12.8	8.8
Forequarter (pony) .	8d.	19.1	15.3	11.1	8.6	6.2
Best ribs (6) . . . .	9½d.	20.1	14.4	20.0	6.8	9.5
Sirloin . . . . .	11d.	18.3	16.4	16.9	6.7	6.8
Rump steak (trimmed)	16d.	—	19.7	14.2	5.5	4.0
Topside . . . . .	10d.	—	20.9	10.6	9.4	4.8
Silverside . . . . .	9d.	15.5	17.2	8.2	8.6	4.1
Thick flank . . . . .	9d.	5.5	18.6	19.9	9.3	9.9
Thin flank . . . . .	4½d.	19.8	18.1	22.7	13.1	22.7

It will be seen from the above table that the cheapest joints are the thin flank and the neck. They occupy this position because of their lack of flavour and other disadvantages. The neck meat is very close and tough and can only be used in stews, &c., the flank consists of alternate layers of fat and lean, and though it can be cooked as a joint it is inferior in flavour. The thick flank ranks next in value but it is considerably more palatable than the thin flank, hence the increase in cost; it is probably the most economical joint of beef we have. The topside (of the leg) and the silverside come next in value, for although they contain little fat, they also contain little bone. The silverside is best when salted and the topside is of good flavour and excellent either as a joint or in beef-steak pudding, &c. The forequarter (the six front ribs) ranks next, and finally the ribs, sirloin, and rump, which are the choicest joints and the least economical. For use in an institution the thick flank, topside, the silverside, and the forequarter can be recommended as economical and otherwise satisfactory joints in the order named.

**'Pieces'.**

In cutting up a bullock the greater number of joints into which it is divided, as compared with a sheep, and the necessary trimming of joints, produces a considerable amount of small pieces of meat which are sold at very low prices. Certain joints, too, such as the shoulder, are for various reasons usually cut up into small steaks.

These 'pieces', as we have said already, represent the cheapest form in which it is possible to buy meat, and full advantage is taken of this fact by the poor. They invariably contain more nutriment per penny of cost than any other part of beef, and as a rule contain little bone or waste. These pieces, of course, cannot be used by an institution and, in this particular, individuals can buy meat at a less cost than institutions.

**Mutton.**

The following table gives the average London price, the percentage composition, and the nutritive value obtained for each penny spent of the joints into which the sheep is divided:—

	Price per lb.	% Composition.			Nutritive value per 1d.	
		Refuse.	Proteid.	Fat.	Proteid.	Fat.
Neck ('scragg end') .	6d.	26.4	12.3	19.6	9.1	14.7
Neck (best end) . .	8d.	19.4	11.7	30.0	6.6	17.0
Loin . . . . .	10d.	11.7	13.0	36.8	6.3	16.6
Leg . . . . .	11d.	17.7	15.4	14.5	6.3	6.0
Shoulder. . . . .	9d.	22.1	13.7	17.1	6.7	7.4

Consideration of the above table shows that the most economical joint is the scragg end of the neck. This joint contains much bone and waste and can only be used for stews, &c., and it is due to these limitations that its price is low and that it is a really economical joint. All the other joints are rather extravagant as

compared with beef. In practice we find the neck and the leg give the best results, but the fact that the leg is expensive makes it advisable that this joint should not be used frequently.

If we compare the nutritive values of the various joints of beef and mutton we find that the following are economical:—

BEEF.	MUTTON.
Shoulder steaks and other 'pieces'.	Neck (scragg end).
Neck.	
Thick flank.	
Thin flank.	
Topside.	
Silverside.	
Forequarter.	

There is a greater selection of economical joints of beef than of mutton.

As a matter of fact, trimmings bought by the poor, too, are generally obtained in cutting up beef—mutton trimmings being mostly fat. We should expect, then, that the poor take more beef than mutton in their diets; inquiry shows that this is so. Dunlop, Paton, and Inglis in their work, *Study of the Diet of the Labouring Classes in Edinburgh*, state that the average amount of beef taken by a large number of families was 72 grammes per man as against 16 grammes of mutton.

#### Beef and Mutton Organs.

The internal organs of the sheep and bullock can be arranged in two distinct classes from the point of view of comparative economy according as to whether they are sufficiently palatable to be in demand at the tables of the well-to-do, or not. The following table gives the percentage composition, average London price per lb., and the amount of nutriment obtained for each penny of the various organs.

	Price per lb.	% Composition.			Nutriment per 1d.	
		Refuse.	Proteid.	Fat.	Proteid.	Fat.
Beef kidney . . .	10d.	19.6	13.7	1.9	6.1	1.2
tripe . . .	8d.	—	11.7	1.2	6.5	1.2
Sheep kidney . .	12d.	—	16.5	3.2	6.2	1.3
liver . . .	8d.	—	23.1	9.0	13.0	5.1
Beef liver . . .	4d.	7.3	20.2	3.1	22.7	3.5
heart . . .	3d.	5.9	16.0	20.4	24.0	30.7
Sheep heart . . .	4d. each	—	16.9	12.6	19.0	14.3

Beef kidney is in demand among the well-to-do for such dishes as beef-steak and kidney pie, soups, &c. Tripe is a luxury of the poorer classes, and sheep's kidneys are a luxury of the better classes. The great demand for each of these food-stuffs keeps up their price. These three are by no means economical, but the remaining four are much used among the working classes as cheap foods.

The remaining four are not so palatable nor are they in such demand; the prices are therefore low, and a considerable amount of nutriment is obtained for a comparatively small sum.

Among these latter, sheep liver is preferable to that from the bullock.

Heart meat is somewhat flavourless and tough, but it yields a large amount of nutriment per penny.

These last four food-stuffs enter into the dietaries of the great majority of the working class, and as cheap sources of proteid they should find a place in every economical diet.

### Pork.

Pork differs from beef and mutton, for, in addition to supplying proteid, it is an economical source of fat. This is due to the fact that the cost of raising pigs is much smaller than that of raising beef or mutton. The pig can be kept in confinement and

fed on kitchen and garden waste for the greater part of its life, requiring special feeding only during the period of fattening previous to killing. The meat is thus produced at the minimum cost, with the result that the fat is cheaper than milk fat, as the following comparison shows:—

Butter at 1s. per lb. gives 29 grammes of fat for every 1d. spent. Bacon at 6d. per lb. gives 44.6 grammes of fat for every 1d. spent.

For this reason bacon is largely used by the poor as a cheap source of fat. The owner of pigs, therefore, pushes the fattening of pigs to the extreme, because the fat commands a ready market when cured.

The following table gives the percentage composition of the various joints into which the pig is divided, the average price per lb., and the nutritive value per penny:—

	Cost per lb.	% Composition.			Nutritive value per 1d.	
		Refuse.	Proteid.	Fat.	Proteid.	Fat.
Neck . . . . .	8d.	18.1	14.1	25.5	8.0	14.4
Loin . . . . .	8d.	19.3	13.2	26.0	7.4	14.6
Leg . . . . .	7d.	10.8	14.8	29.7	9.1	19.0
Leg, cured (ham) .	8½d.	12.2	14.5	33.2	7.6	17.5
Shoulder . . . . .	6d.	12.4	12.0	29.8	9.0	22.3
Belly cured (streaky bacon) . . . . .	6d.	8.7	9.5	59.4	7.1	44.6
Back fat cured (fat bacon) . . . . .	6d.	almost all fat, probable value per 1d.			8.0	56.0

The figures in the above table probably give a fair account of pork as we get it in England, but very great variations are found which makes it almost impossible to get exact information. Thus English pork, bacon, &c., is very fat; pork, &c., imported into London from Holland, on the contrary, is rather lean; then again there is infinite variation in the composition of imported ham and bacon.

From the consideration of the above table it appears that the fresh leg and shoulder of pork are the most economical joints, the neck and loin being more expensive. The leg is probably the most useful joint for an institution, but the poor are compelled to buy smaller amounts and are therefore almost obliged to take the less economical neck or loin chops which, however, when compared with joints of beef and mutton, are still economical.

Cheap ham (8½d. and under) is also seen to be fairly economical. Bacon, more as a cheap source of fat than of proteid, must appear in every economical dietary.

#### **Fish.**

Fish is an excellent source of proteid, and some varieties contain an appreciable amount of fat. It should enter into the composition of every dietary occasionally, if only for the sake of variety. Certain fish are never economical to buy, e.g. salmon and large soles; here we pay for flavour rather than for nutritive value. There is, however, another and still more important factor materially affecting the economy of fish-buying, which is practically absent as regards other classes of food. We refer to the great variation from time to time in the supply. Storms and other conditions make the available supply of fish very small at certain seasons, and the prices high. On other occasions a much larger amount of fish arrives in the market than is required to meet the demand and the price is consequently low. At such times it is possible in some seaports to buy excellent fish at ridiculously low prices. These continual fluctuations make it

impossible to give an average price for any variety which is of the slightest value as a guide in economical buying, but it is safe to say that no fish is ever economical when it is not abundant. Herrings, plaice, and cod, when in season and plentiful, are usually fairly economical to buy. Cured fish, such as bloaters, haddock, cod, &c., does not vary so much in price, as it can be kept for longer periods than fresh fish. It is, as a rule, in season, more economical to buy than fresh fish, unless the latter is very cheap. Probably the greatest amount of nutriment can be bought for a given sum in bloaters or herrings than in any other kind of fish.

Another point to remember in buying, is that some fish contains much waste, 60 % being a not uncommon figure, and this must be taken into consideration in determining the real value of any fish.

Fish that is canned, where it is very plentiful, can be bought very cheaply in this country for the same reason that canned meat is purchasable at low price. Tinned salmon is a very cheap form in which to buy fish, and as it contains much fat it is also a useful source of energy. Salmon at 5*d.* a tin forms an excellent and economical addition to a dietary.

#### **Clear Soups, Beef Teas, &c.**

These foods have been shown by analysis to contain only a very small amount of nutriment. They consist of a solution of salts and extractives in great measure, and although of considerable service in the treatment of certain acute diseases, are of no value in the treatment of a disease like tuberculosis, which necessitates the taking of a large amount of nutriment. Thick





soups are, however, of value according to the amount of flour, milk, egg, pulse, &c., they contain.

Soups may be used as a vehicle in which to take other nutritive food-stuffs, and indeed are very useful for this purpose in the more acute forms of the disease, but no reliance must be put upon what the cook calls 'strong soup' (which probably contains only 2 or 3 % of gelatine and a trace only of proteid) as a food-stuff.

#### **Eggs.**

An egg yields about 6 grammes of proteid and 4 of fat. If eggs cost 1d. each it is clear that they are an extravagant food. Unfortunately, many otherwise economical puddings require eggs: for this purpose, however, it is unnecessary to use fresh eggs, imported eggs answering the purpose equally well. These imported eggs are, as a rule, smaller than the English, and probably therefore do not contain quite so much nutriment. Even if they cost only  $\frac{1}{2}$ d. each we only secure 12 grammes of proteid and 8 of fat for each penny spent, so that at their cheapest they are not economical. We think their use should be limited to cooking purposes, and that even then the number used should be small.

The working man uses too many eggs, as a rule, the explanation being that an egg is very easy to cook and is introduced into his diet simply to save trouble.

#### **Cheese.**

The composition of the various varieties of cheese is almost constant. American cheese, for example, contains 29 % proteid and 36 % fat. Cheeses vary considerably in price, and this variation is entirely due to the greater

or lesser delicacy of flavour. The cheaper cheeses are distinctly economical, American cheeses at 6*d.* per lb. yielding 21·8 grammes of proteid and 27·0 grammes of fat for each penny spent. As a source of proteid and of energy cheese stands between the pulses and meat in the economic scale. It is important that the cheaper cheeses only should be used in an economical dietary, the more expensive varieties, as already explained, having no advantage over them, except that of superior flavour.

Cheese, if taken raw, is somewhat difficult of digestion, since the fat prevents the digestive juices from easily permeating the mass. There is also a variable amount of fatty acid present, formed in the process of ripening, which may cause indigestion, but these disadvantages are overcome by cooking cheese in various ways after dissolving it by the aid of bicarbonate of soda. The absorption of cheese by the intestine is very complete.

#### Pulses.

The following table gives the percentage composition of the chief pulses, their average retail price, and the nutritive value per penny:—

	Price per lb.	% Composition.			Nutritive value per 1 <i>d.</i>		
		Proteid.	Fat.	C.-H.	Proteid.	Fat.	C.-H.
Dried peas . .	2 <i>d.</i>	24·6	1·0	62·0	55·4	2·3	189·5
Haricot beans	2 <i>d.</i>	18·1	1·5	65·9	40·7	3·4	143·3
Lentils . . .	2 <i>d.</i>	25·7	1·0	59·2	57·8	2·3	183·2

We obtain proteid in the pulses at the lowest possible price but in the most unpalatable form; in addition to this, the pulses supply a considerable amount of carbohydrate.

The following are the chief disadvantages in the use of vegetable proteid contained in the pulses:—

1. There is very great difficulty in making the pulses palatable to those accustomed to a mixed diet.

2. Great care and attention are required to prepare them for use.

3. The pulses are digested with some difficulty, but they are absorbed almost as completely as meat if taken in finely divided form, as a soup or a mash, otherwise they are absorbed very incompletely.

4. It is necessary to take a considerable bulk in order to consume the necessary amount of proteid. This is due to the fact that pulses absorb water in cooking, meat on the contrary loses it. The following figures are intended to show the effect of cooking upon the pulses and meat respectively:—

	<i>Proteid.</i>	<i>Calories.</i>		<i>Proteid.</i>	<i>Calories.</i>
Uncooked peas	24.6 %	364	After cooking	8.8 %	118
Uncooked beef	17.8 %	231	After cooking	23.7 %	335

For a given amount of proteid, it is therefore necessary to take, roughly, three times as much cooked pulse as cooked meat; the extra bulk, moreover, consists entirely of water. In spite of this disadvantage, pulses can be used with great advantage in economical diets, providing that the pulses are not given in very large quantities. With the addition of a little stock made by boiling bones, &c., pulses can be made into excellent soup. They can also be used as vegetables, and for adding to stews, &c.

In these ways 30 grammes of proteid, or a quarter of the day's requirement, can be taken without any appreciable sacrifice of the palatability of the diet as a whole.

(The question as to whether vegetable is as useful as animal proteid is discussed in a later chapter.)

**Bread and Flour.**

The working man derives at least a third of his energy and a quarter of his proteid from this source. The following figures, showing the percentage composition, the average price, and the amount of nutriment per penny, give a fair idea of the great cheapness of bread and flour:—

	Price	% Composition.			Nutriment per 1d.		
	per lb.	Proteid.	Fat.	C.-H.	Proteid.	Fat.	C.-H.
Bread . . .	1.25	9.0	1.0	50.0	32.4	3.6	180.0
Flour . . .	1.8	12.0	1.5	73.0	43.0	5.1	252.3

Bread is the foundation of the diet of working men, and the more it is used the cheaper the diet will be, if the nutritive value remains the same. It must be used freely in all economical diets, but at the same time it must be remembered that there are other economical food-stuffs which ought to be used to some extent for the sake of variety.

Flour is even more economical than bread, and should be used for puddings, &c., when possible.

When we compare the amount of bread and flour used by a working man's household, we find that the proportion is about 1 to 40. This is accounted for by the fact that flour always requires cooking, for which the wife has in some cases no time and in others no ability. When she can be persuaded to spend a little time in cooking, more flour will be used with advantage to the economy of the diet and more variety will be secured.

**Potatoes.**

	Price	% Composition.		Nutriment bought	
	per lb.	P.	C.-H.	per 1d.	
Potatoes as purchased	6d.	1.8	14.7	13.5	110.0

It will be seen from these figures that potatoes are

more expensive than bread, both as a source of energy and also of proteid. They are fairly economical, however, and their use, to a moderate extent, in a diet is advisable, since the potato possesses valuable anti-scorbutic properties and furnishes a welcome change from bread.

#### Oatmeal.

The following is the percentage composition of oatmeal, its average retail town price, and the amount of nutriment obtained for each penny spent :—

	Price per lb.	% Composition.			Nutriment per 1d.		
		Proteid.	Fat.	C.-H.	Proteid.	Fat.	C.-H.
Oatmeal . . .	2d.	16.1	7.2	67.6	36.3	16.0	152.0
Roll'd oats, &c.	2.75d.	16.5	7.3	66.5	26.4	11.7	106.4

It will be seen from these figures that oatmeal is a very economical source of both energy and proteid. It certainly should be included in the form of porridge in economical diets.

Specially prepared oats, although more palatable and more easily digested by some people, have no nutritive advantage over plain oatmeal and are more expensive. The two are contrasted in the above table.

#### Sugar.

Sugar consists of practically pure carbohydrate, and is one of the cheapest forms in which we can buy energy, 227 grammes of carbohydrate being purchased for each penny. It is clear that working men would make full use of sugar in their diets, but unfortunately sugar cannot be taken in very large amounts as it tends to derange digestion. The average working man takes about 8 oz. daily, and this seems to us to indicate the probable limit to which sugar can be taken regularly

without becoming distasteful or producing other untoward effects.

### **Treacle and Syrup.**

Treacle and syrup contain about 75 % carbohydrate, the remainder being impurities from cane sugar, water, &c. There is little difference between the real cost of equal nutritive values of treacle and sugar.

### **Jam, &c.**

These articles may be considered as diluted and flavoured forms of sugar. They require a considerable amount of labour in preparation, and are consequently more expensive than sugar. Equal nutritive value costs practically twice as much in the form of jam as in sugar. In spite of this, jam is still a distinctly economical article of diet and adds variety, so that its use is indicated to a moderate extent in cheap diets.

### **Rice, Sago, &c.**

The following table gives the percentage composition, average in town price, and amount of nutriment bought per penny, of the various food-stuffs:—

	Price per lb.	% Composition.			Nutriment per 1d.		
		Proteid.	Fat.	C.-H.	Proteid.	Fat.	C.-H.
Rice . . . . .	2d.	8.0	0.8	79.0	18.0	0.7	178.0
Sago and tapioca	2d.	—	—	82.0	—	—	184.5
Barley, pearl . .	2d.	8.5	1.1	77.8	19.1	2.5	175.0
Hominy . . . .	2d.	8.2	0.6	78.9	18.5	1.3	172.5
Cornflour . . .	4d.	—	—	84.9	—	—	95.5

It will be seen that all these food-stuffs are decidedly economical with the exception of cornflour, which, however, is not so uneconomical as to prevent its occasional use for the sake of the variety it affords.

All these food-stuffs require cooking to fit them for use, and for this reason they are not much used by the working classes.

When made into puddings, &c., with skimmed milk, they form a very economical and nutritive food at the expense of a very little trouble. They should be employed in every economical diet.

#### **Figs, Dates, Raisins, Currants, &c.**

Dried fruits, in contrast to fresh fruit, yield a very considerable amount of nutriment per penny spent, as the following table will show:—

	Price per lb.	% Composition.			Nutriment per lb.		
		Proteid.	Fat.	C.-H.	Proteid.	Fat.	C.-H.
Dates . . . .	2½d.	1.9	2.5	70.6	3.4	4.5	127.1
Figs . . . .	3½d.	4.3	0.3	74.2	7.7	0.5	95.4
Raisins . . . .	3d.	2.3	3.0	68.5	3.5	4.5	102.7
Currants . . . .	3d.	2.4	1.7	74.2	3.5	2.5	111.3

We see from these figures that such fruits are really economical and may be used in cooking with advantage, for by their use a greater variety is possible in the way of suet puddings with various flavours.

#### **Green Vegetables.**

These are not used in a dietary so much as a source of proteid or energy, constituents in which they are very poor, as for the various salts they contain. They should be present in every diet to a certain extent, but they must not be relied upon as sources of nutriment.

The following tables summarize the economics of various food-stuffs as sources of proteid and energy.

TABLE OF FOOD-STUFFS ARRANGED ACCORDING TO THEIR VALUES  
AS SOURCES OF PROTEID.

		<i>No. of Proteid grammes bought per 1d.</i>
Vegetable food-stuffs	Pulses	53
	Flours	43
	Oatmeal	36
	Bread	32
Cheap dairy food-stuffs	Separated milk	25
	Cheese	22
Cheap animal organs	Beef heart	24
	„ liver	23
	Sheep heart	19
	„ liver	13
Meat	Beef 'pieces'	20 to 25
	Tinned beef	19
	Frozen beef	12
	English beef	10
Expensive dairy food-stuffs	Milk	10
	Eggs	6 to 12
Other food-stuffs used chiefly for the supply of energy which contain a fair amount of proteid	Rice	18
	Potatoes	13
	Bacon	7



## CHIEF FOOD-STUFFS

TABLE OF FOOD-STUFFS ARRANGED ACCORDING TO THEIR VALUES  
AS SOURCES OF ENERGY.

<i>Vegetable Foods.</i>	<i>Fats.</i>	<i>Dairy Produce.</i>	<i>Meat.</i>	<i>No. of Calories bought per 1d.</i>	
Flour . . .	. . . . .	. . . . .	. . . . .	1257	Used chiefly as sources of Energy.
Sugar and treacle . .	. . . . .	. . . . .	. . . . .	1080	
Bread . . .	. . . . .	. . . . .	. . . . .	904	
Pulses . . .	. . . . .	. . . . .	. . . . .	820	
Rice, sago, barley, &c. . . . .	. . . . .	. . . . .	. . . . .	810	
	Dripping . . . . .	. . . . .	. . . . .	800	
Oatmeal . . .	. . . . .	. . . . .	. . . . .	776	
	Lard . . . . .	. . . . .	. . . . .	700	
	Suet . . . . .	. . . . .	. . . . .	560	
	'Vegetable suet' . . . . .	. . . . .	. . . . .	520	
Potatoes . . .	. . . . .	. . . . .	. . . . .	506	
Currants, raisins, &c. . . . .	. . . . .	. . . . .	. . . . .	492	
	'Vegetable butter' . . . . .	. . . . .	. . . . .	460	
	Bacon . . . . .	. . . . .	. . . . .	444	
	Margarine . . . . .	. . . . .	. . . . .	420	
		Beef heart . . . . .	. . . . .	377	Used chiefly as sources of Protein.
		Cheese . . . . .	. . . . .	340	
		Butter . . . . .	. . . . .	280	
		Separated milk . . . . .	. . . . .	280	
		Tinned beef . . . . .	. . . . .	280	
		Milk . . . . .	. . . . .	202	
		Frozen meat . . . . .	. . . . .	134	
		Beef liver . . . . .	. . . . .	130	
		English beef . . . . .	. . . . .	127	
		Eggs . . . . .	. . . . .	62 to 124	

## CHAPTER V

### THE ECONOMICS OF DIETS


#### DEFINITION OF AN ECONOMIC DIETARY.

IN a previous chapter we stated our opinion as to the nutritive value of the diet which is most suitable for the treatment of the majority of consumptives.

We have also discussed the relative economy and nutritive value of the chief food-stuffs.


We have now to consider how a diet of a nutritive value suitable for the treatment of consumption can be most economically constructed. When discussing the relative economy of various diets, it is necessary to have some standard of comparison. We have, in short, to define what we mean by an economic diet.

This is not so easy to do as might at first sight appear. Judged solely from a standpoint of actual cost per day, a series of dietaries can be easily compared by the following method. Assuming a knowledge of the percentage composition of the various food-stuffs used in various dietaries we can determine




the total number of grammes of proteid and the total number of Calories contained in each of the diets to be compared; with this information and with a knowledge of the total daily cost of the diets, we can then by simple division determine the number of grammes of proteid and the number of Calories which are bought for every penny spent on each individual diet. The cheaper the diet the greater amounts of proteid and energy bought per penny, and vice versa.

The comparative economic efficiency of a series of diets cannot, however, be settled absolutely on these lines, for the diet which costs the least, or is most cheaply bought, is not necessarily the one which is the most efficient from an economic standpoint. There are other factors which must be considered along with that of cost. In the first place a diet which fails to supply the individual taking it with an adequate amount of nourishment for his physiological requirements, is economically unsound however cheaply it may be bought. A diet also, which contains an appreciable amount of nourishment in excess of his physiological requirements, is also unsound, since a part of the food is not really needed. To be economically sound then, a diet must be physiological, viz. it must supply as nearly as possible the exact amount of food necessary for the requirements of the person who takes it. The specific purpose for which a diet is used, must also be taken into account. In everyday life, the dietetic requirements of individuals in normal health vary considerably, and these variations are reflected in the cost of their various dietaries. In the case of invalids food-requirements are even more varied. In the diet of dyspeptics, for example, somewhat expen-



sive articles of food have often to be included. These foods could not however be replaced by others of lower cost and of similar nutritive value without detracting from the efficiency of the diet for its particular purpose. In this case the more expensive diet, being the more suitable, is the sounder one from an economic standpoint. Further, we have when making comparison of various diets in this way, to take into consideration their palatability. To be satisfactory, dietaries must be well cooked and sufficiently varied. A diet, however cheaply bought, is not economically sound if it is not sufficiently palatable, for after a time it will not be properly taken. It is essential, even for the poor, that a diet should be to the liking of those for whom it is prescribed. To be economically efficient then, a diet must be physiologically adequate and should be bought at the lowest cost which is compatible with the proper degree of palatability and variety. The following diets from Rowntree's work, *Poverty, a Study of Town Life*, serve to illustrate some of these points. The first dietary is one which was actually taken by a very poor family. This family consisted of a man, his wife and two children, and their total income amounted to one pound per week.



	<i>Breakfast.</i>	<i>Dinner.</i>	<i>Tea.</i>	<i>Supper.</i>
<b>SUNDAY . .</b>	Bread, butter, shortcake, and coffee.	Pork, onions, potatoes, and Yorkshire pudding.	Bread, butter, shortcake, and tea.	Bread and pork.
<b>MONDAY .</b>	Bread, bacon, butter, and tea.	Pork, potatoes, pudding, and tea.	Bread, butter, and tea.	Cup of tea.
<b>TUESDAY .</b>	Bread, bacon, butter, coffee.	Pork, bread, and tea.	Bread, butter, boiled eggs, tea.	Bread, bacon, butter, and tea.
<b>WEDNESDAY</b>	Bread, bacon, butter, and tea.	Bacon, eggs, bread, butter, tea.	Bread, butter, and tea.	
<b>THURSDAY .</b>	Bread, butter, coffee.	Bread, bacon, tea.	Bread, butter, tea.	
<b>FRIDAY . .</b>	Bread, butter, tea.	Bread, butter, tea.	Bread, butter, tea.	
<b>SATURDAY .</b>	Bread, bacon, coffee.	Bacon, potatoes, pudding, tea.	Bread, butter, shortcake, tea.	Tea, bread, kippers.

This dietary was not at all a palatable one, and it contained only the cheaper forms of food-stuff. The daily cost of this diet was only 6·57 pence per day per man, and for every penny spent 15·5 grammes of proteid and 471 Calories were obtained. The nutritive value of this diet, however, was inadequate for those who took it, so that in spite of being very cheaply bought, it was economically unsound. The next diet is that of a family consisting of a man, his wife and two children, with a total income of 27s. a week.

	<i>Breakfast.</i>	<i>Dinner.</i>	<i>Tea.</i>	<i>Supper.</i>
<b>SUNDAY</b> .	Fried bacon, bread, milk, tea, tomatoes.	Pork, potatoes, cauliflower, Yorkshire pudding, beer.	Bread, butter, milk, tea, pastry, celery.	Pork and bread.
<b>MONDAY</b> .	Boiled bacon, bread, milk, tea.	Pork and potatoes.	Bread, butter, pastry, milk, tea.	Cold pork and bread.
<b>TUESDAY</b> .	Bacon, bread, milk, tea.	Pork and potatoes.	Bread, butter, pastry, milk, tea.	Bacon and bread.
<b>WEDNESDAY</b>	Bacon, bread, milk, tea.	Stewed beef, potatoes, bread, jam pudding.	Bread, butter, pastry, milk, tea.	Hash and potatoes.
<b>THURSDAY</b> .	Bacon, bread, milk, tea.	Liver, potatoes, cauliflower, bread.	Bread, butter, pastry, milk, tea.	Gruel.
<b>FRIDAY</b> . .	Bacon, bread, milk, tea.	Sausage, bread, potatoes.	Salmon, bread, milk, tea.	Gruel.
<b>SATURDAY</b> .	Fried bacon, bread, milk, tea.	Mutton, bread, potatoes.	Bread, butter, boiled eggs, cakes, tea.	Fried fish, potatoes, bread.

This dietary was a much more appetizing one than the former, and may be taken as a fair representative of the average diet taken by the better-class working man. It cost considerably more, viz. 10.2 pence as compared with 6.5 pence. It was also more expensively bought, for only 11.5 grammes of proteid and 386 Calories were purchased for each penny spent as compared with 15.5 grammes proteid and 471 Calories in the former case.

The diet now under consideration however, unlike the former, is quite adequate from a nutritive

standpoint, and consequently is, in this important respect, economically sound. To obtain further evidence as to the average sum spent by the working classes on the purchase of an efficient diet of their own election, we analysed the diets of 100 working-class families in England and America, and determined the average nutritive value and cost of the same. We might add that all the families selected for the purposes of this table were, for their position in

TABLE SHOWING THE AVERAGE OF 100 EFFICIENT DIETARIES  
TAKEN BY WORKING-CLASS FAMILIES.

<i>Food-stuffs.</i>	<i>Amount Grammes.</i>		<i>Price (retail).</i>	<i>Cost in pence.</i>	<i>Proteid.</i>	<i>Fat.</i>	<i>Carbo-hydrate.</i>
Milk . .	$\frac{1}{2}$ pt.	280	@ $1\frac{1}{2}$ d. per pt.	.75	10	11	14
Meat <sup>1</sup> .	9 oz.	250	@ 7d. per lb.	3.98	38	48	—
Butter .	$\frac{1}{4}$ oz.	20	@ 1s. per lb.	.50	—	16	—
Fish . .	2 oz.	56	@ 4d. per lb.	.50	5	1	—
Cheese .	$\frac{1}{2}$ oz.	14	@ 6d. per lb.	.20	4	5	—
Egg . .	one	one	@ 8 for 2d.	.66	6	4	—
Bacon .	2 oz.	56	@ 6d. per lb.	.75	6	24	—
Total Animal Food . . . . .				7.29	69	109	14
Bread <sup>2</sup> .	14 oz.	400	@ $2\frac{1}{2}$ d. per 2 lb.	1.14	36	4	200
Flour . .	1 oz.	28	@ 1s. 4d. per st.	.08	3	—	21
Oatmeal .	$\frac{1}{2}$ oz.	14	@ 2d. per lb.	.07	2	1	10
Potatoes .	9 oz.	250	@ 8d. per st.	.82	4	—	52
Sugar . .	8 oz.	85	@ $8\frac{1}{2}$ d. per lb.	.70	—	—	85
Rice, &c.	$\frac{1}{2}$ oz.	10	@ $2\frac{1}{2}$ d. per lb.	.08	—	—	6
Sundries, vegetables, &c. <sup>3</sup> . . . . .				.48	6	—	20
Total Vegetable Food . . . . .				2.77	51	5	394
Beverages and unnecessary articles of low nutritive value . . . . .				.75	7	—	9
Totals . . . . .				10.81	127	114	417

<sup>1</sup> Includes beef, mutton, pork, liver, sausage, &c.

<sup>2</sup> Includes cakes and buns.

<sup>3</sup> Includes green vegetables, onions, tomatoes, currants, &c.; fruit, tea, coffee, condiments, &c.

life, comfortably off, and able to afford a more expensive diet had they so wished. The results of this analysis are shown in the accompanying table.

From this table it is seen that the average nutritive value of the 100 dietaries (all of which were selected on account of their being adequate from a nutritive standpoint) is proteid 127 grammes, fat 114 grammes, and C.-H. 417 grammes, giving a Calorie value of 3290, and that the average cost (including beverages and other articles of low nutritive value) is almost exactly 11d. per day.

As a matter of interest we see that every penny spent upon the diet bought 12.7 grammes of proteid and 3290 Calories. If luxuries, such as beer, are omitted from this average diet its cost would work out at 10d. per day. The results of this analysis thus agree very closely with the results of Rowntree's inquiry into the average cost of an efficient diet taken by the working man when in work. For purposes of comparison we give, in tabular form, the results of these two series of observations:—

NUTRITIVE VALUE.

	P.	Cals.	Total cost.	No. of Grs. of P. bought per 1d. spent.	No. of Cals. bought per 1d. spent.
Average of efficient diets taken by Working Men in York (Rowntree).	119	3637	10.2d.	11.5	336
Average of 100 efficient diets taken by working men in England and America, less the cost of beer (Bardswell & Chapman).	127	3290	10d.	12.7	329



We conclude then that an economic diet for the working classes is one which

- (1) Has an adequate nutritive value;
- (2) Costs tenpence a day;
- (3) Buys some 12 grammes of proteid and 330 Calories for every penny.

#### THE DIETETIC RESEARCH AT THE MUNDESLEY COTTAGE SANATORIUM [JANUARY TO JUNE, 1903].

We shall now describe our first attempt to construct a cheap and efficient diet for the treatment of the consumptive working man.

This research was carried out in a small private house in Mundesley which we converted into a Cottage Sanatorium. The research may be divided into two periods, viz. (1) Preliminary Observations, and (2) The Research Proper. The preliminary observations were made on the first lot of patients admitted to the Cottage Sanatorium, and helped us to decide upon the composition of the diet for use during the research proper.

##### (1) Preliminary Dietetic Observations.

In accordance with our principles for the dieting of consumptives which we have already described, we constructed a diet with a nutritive value of 156 grammes of proteid, and a Calorie value of 3448. The cost of this diet worked out at 1s. per day. The following was its composition :—

# THE ECONOMICS OF DIETS

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## MUNDESLEY COTTAGE SANATORIUM.

	Composition of the Diet Prescribed.					Cost in pence.
	Amount.		Proteid.	Nutritive value.		
	Gram.	Oz.		Fat.	Car.-Hyd.	
Separated Milk .	2250	80	74.4	4.0	112.0	8.00
Meat . . . . .	228	8	41.0	27.4	—	4.50
Suet . . . . .	28	1	1.4	28.0	—	.40
Margarine . . .	85	3	—	68.0	—	1.41
Cheese . . . . .	—	—	—	—	—	—
Eggs . . . . .	28	1	8.0	2.0	—	.48
Bacon . . . . .	14	$\frac{1}{2}$	1.2	4.7	—	.24
TOTAL ANIMAL FOOD . .			121.0	129.1	112.0	9.98
Bread . . . . .	228	8	20.0	2.0	114.0	.68
Potatoes . . . .	140	5	2.6	—	28.0	.11
Oatmeal . . . . .	28	1	4.7	2.0	20.0	.20
Sugar . . . . .	28	1	—	—	28.0	.12
Jam . . . . .	28	1	2	—	20.0	.20
Rice, &c. . . . .	14	$\frac{1}{2}$	.7	—	11.2	.08
Flour . . . . .	56	2	6.5	—	42.0	.16
Green vegetables and sundries .			.5	—	8.0	.70
TOTAL VEGETABLE FOOD .			35.2	4.0	271.2	2.15
TOTAL FOOD . . . . .			156.2	133.1	383.2	12.13
Grammes of proteid bought per penny 12.8 Calories bought per penny . . . . . 284						
Total Calorie value 3448						

This dietary was given in four meals, viz. breakfast at 8.30, dinner at 1.30, tea at 5, cold supper at 8. Meat or fish was given at three of these meals every day. The next table shows the weekly menu: this was arranged so as to give as much variety as possible:—

## THE WEEKLY ARRANGEMENT OF MEALS.

	<i>Breakfast.</i>	<i>Dinner.</i>	<i>Tea.</i>	<i>Supper.</i>
<b>SUNDAY . .</b>	Porridge, fried fish, and egg.	Roast mutton, gingerbread pudding.	Tea, bread and butter, jam or cress.	Cold mutton, rice pudding.
<b>MONDAY .</b>	Porridge, bacon and egg.	Roast beef, suet pudding.	do.	Cold beef, sago pudding.
<b>TUESDAY .</b>	Porridge, bloater, egg.	Fresh fish, Potato pie or mince, marmalade pudding.	do.	Cold beef, tapioca pudding.
<b>WEDNESDAY</b>	Porridge, bacon and egg.	Boiled mutton (onions, &c.), date pudding.	do.	Cold mutton, ground rice pudding.
<b>THURSDAY .</b>	Porridge, kipper, egg.	Roast beef, treacle pudding.	do.	Cold beef, rice pudding.
<b>FRIDAY . .</b>	Porridge, bacon and egg.	Fresh fish, hash, mince, &c., lemon pudding.	do.	Cold beef, sago pudding.
<b>SATURDAY .</b>	Porridge, herring, egg.	Roast pork, fig pudding.	do.	Tripe and onions, tapioca pudding.


It will be noted that in this dietary we made full use of such economical food-stuffs as separated milk and margarine. Local conditions, however, made it necessary for us to use fresh English meat instead of the cheaper foreign meat; the use of foreign meat, of course, would have meant considerable economy.

**Method of Observation.**—Throughout the period of research, we sent to the Cottage Sanatorium, at regular intervals, definite amounts of the various food-stuffs

necessary to supply the patients under treatment with the prescribed dietary. These amounts were carefully recorded. All food not used, and all waste were also recorded. By these means we were able to calculate the average amounts of the various food-stuffs consumed per patient during any definite period. We arranged that the number of men under treatment at the cottage should remain constant; this made the calculation, and ordering of the amounts of food required, a simple matter. Throughout the research all made dishes, such as puddings, were made by weight or measure, so that the composition of these articles remained constant. The food was at first weighed out to the men, but after a little practice, the housekeeper learned to divide it sufficiently accurately without weighing every individual portion. This division of the food was made the easier by all the men having the same diet. It was therefore a question of equal division, and the fairness with which this was carried out was a matter in which the patients were themselves interested.

#### **The Research Proper.**

The research proper lasted for three months. The diet which we prescribed during this period was, in its main features, similar to the diet used during the period of preliminary observation. It is unnecessary, then, for us to describe it in detail. We made some slight modifications in the preliminary diet, the modifications being suggested to us by the men themselves. In spite of these slight alterations, however, the patients during the six months of the research, asked for further changes in the dietary, and this resulted in it becoming larger than we had intended. At the e





The table upon the preceding page shows the absolute amounts of food taken daily per patient during the three months of the research proper. It is not, of course, to be supposed that each patient took all the articles of food—for instance, beef, mutton, and pork on the same day. They took these in turn during the week, and the total quantities taken of each, divided by seven, gives the daily average as shown in the table.

**Criticism of the Diet taken by the Patients at  
the Cottage Sanatorium.**

**Nutritive Value.**

The first point that strikes one on looking at the diet actually taken is its high nutritive value. The diet, in fact, was very much larger than we had intended the patients to have. The following comparisons between the diets prescribed and actually taken is of interest:—

	<i>P.</i>	<i>F.</i>	<i>C.-H.</i>	<i>Cals.</i>
Nutritive value of diet originally prescribed	155.8	188.1	888.2	8448
Diet actually taken .	208.5	145.4	584.9	4400

The size (nutritive value) and cost of the diet taken, compared with the average diet taken by 100 working men when in health, referred to on p. 96, is also of interest. This is shown in the following table:—

<i>Ordinary Diet of 100 better class Working Men.</i>				<i>Cottage Sanatorium Diet.</i>		
<i>Food-stuffs.</i>	<i>Amount (grammes).</i>	<i>Cost in pence.</i>	<i>% of Total Cost.</i>	<i>Amount (grammes).</i>	<i>Cost in pence.</i>	<i>% of Total Cost.</i>
Milk . .	280	.75	7.5	1888	2.49	15.4
Meat . .	250	3.93	39.3	880	7.15	44.3
Butter, &c.	20	.42	4.2	66	1.87	8.4
Fish . .	56	.50	5.0	112	1.04	6.4
Cheese . .	14	.20	2.0	—	—	—
Egg . .	one	.66	6.6	2 <sup>1</sup> / <sub>2</sub>	.65	4.1
Bacon . .	56	.75	7.5	22	.36	2.2
Total Animal Food .		7.21	72.1		13.06	80.8
Bread . .	400	1.14	11.4	415	1.14	7.0
Flour . .	28	.08	.8	58	.16	1.0
Oatmeal . .	14	.07	.7	37	.21	1.3
Potatoes . .	250	.32	3.2	270	.25	1.6
Sugar . .	85	.70	7.0	59	.23	1.4
Rice, &c. .	10	.05	.5	19	.06	.5
Sundries		.43	4.3		1.08	6.4
Total Vegetable Food		2.79	27.9		3.08	19.2
		10.00			16.14	

### Clinical Efficiency of the Diet.

There is no question but that the diet was thoroughly efficient from a clinical standpoint. The very satisfactory way in which the patients who took this diet progressed, afforded ample evidence as to its being an adequate one for its purpose. The following table shows the results obtained at the Cottage Sanatorium during the period in which the diet was taken.

From the table it is seen that twelve patients were treated, of whom four were cases of early disease, three cases of fairly recent but somewhat extensive disease with some degree of fever, and five cases of chronic disease of long standing. Of these twelve patients

# THE RESULTS OF TREATMENT AT THE MUNDESLEY COTTAGE SANATORIUM.

Type of Disease.	Age.	Condition on Admission		Condition on Discharge.		Condition at the present time (4 years after discharge).
		Appetite and Digestion.	Relation to H. K. W.	Clinical result.	Gain in weight.	
GROUP I.						
Early disease, one lobe. Constitutional disturbance slight or nil.	36	Good	+3 lb.	Complete arrest	3 lb.	Good health : at full work.
	30	Good	-4 lb.	Complete arrest	5 lb.	Good health : at full work.
	30	Good	-5 lb.	Complete arrest	7 lb.	Good health : at full work.
	28	Good	+28 lb. <sup>1</sup>	Complete arrest	5 lb.	Good health : at full work.
GROUP II.						
Fairly recent, but somewhat extensive disease of two or more lobes, with varying degrees of activity.	32	Good	equal to	Incomplete arrest A	—	Dead (worked for one year).
	22	Bad	-11 lb.	No improvement	—	Dead.
	26	Good	-6 lb.	Incomplete arrest A	10 lb.	Lost sight of.
GROUP III.						
Chronic disease of long standing with considerable degree of arrest, and general health but slightly impaired.	38	Good	-5 lb.	Incomplete arrest A	7 lb.	Good health : at full work.
	22	Good	-3 lb.	Incomplete arrest A	4 lb.	Good health : at full work.
	26	Good	+1 lb.	Incomplete arrest B	1 lb.	Good health : at full work.
	27	Good	-9 lb.	Incomplete arrest B	18 lb.	Dead.
	22	Good	-15 lb.	Incomplete arrest B	17 lb.	Poor health : little work.

DEFINITION OF TERMS USED.—H. K. W. : Highest known weight before becoming tubercular.

*Complete arrest* : General health completely restored in every respect and lung disease completely arrested (apparent cure), there being no physical signs present, or only such as are compatible with a completely healed lesion.

*Incomplete arrest A* : General health completely restored, but physical signs of lung disease, though much improved, not entirely cleared up, e. g. perhaps limited to a few moist sounds on cough.

*Incomplete arrest B* : General health only imperfectly restored and physical signs of the disease, e. g. moist sounds, &c., still well marked.

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*Incomplete arrest B* : General health only imperfectly restored and physical signs of the disease, e.g. moist sounds, &c., still well marked.

<sup>1</sup> Under Sanatorium treatment before admission.



the four patients with only early disease were discharged apparently cured, viz. with general health completely restored and with no physical signs in the chest incompatible with a completely healed lesion. As evidence of their good general health, we might add that these four patients were taking from ten to eighteen miles' walking exercise daily. These patients all returned to work on discharge from the Sanatorium, and, at the present, viz. four years later, are all in good health and at work. Of the other eight patients four improved very much, general health being completely restored, but the physical signs, though much less marked than on admission, were not entirely cleared up. Of the remaining four, three materially improved, and one only failed to make any improvement at all. Of these last eight patients three are, at the present time, in good health and at work, one is in poor health and only doing casual work, and three are dead (one of these worked for a year after discharge), and one has been lost sight of.


With regard to the gain in weight. It is seen from the table that the gain in weight in several instances was very slight; this is due to the fact that some of the patients were, on admission, either up to their normal weight, or only a little below it. Three of the patients who were appreciably below their normal weights gained 18 lb., 17 lb., and 10 lb. respectively. The diet, as will be pointed out later, was in fact in excess of the men's requirements, so far as nutritive value was concerned, and several of the patients became obviously fatter than there was any need for them to be, and this, in spite of the large amount of exercise taken. None of the patients, however, suf-

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ferred from any digestive troubles, and their immunity in this respect was probably due to the large amount of walking exercise that was taken. One patient suffered somewhat from dyspnoea on exertion, but declined to take a smaller diet although advised to do so; this dyspnoea, however, was lessened when his exercise was increased from eight to fourteen miles a day.

#### **Palatability and Variety.**

The diet in these two important respects was most satisfactory. During the early part of the observations we invited criticisms from the men upon the diet given to them, and these criticisms are of distinct interest. They have moreover an important bearing upon the economic efficiency of the diet, since it was by modifying the diet from time to time on the lines suggested by the men themselves that it became appreciably larger and more expensive than we had intended. The men told us that the allowance of both fish or bacon and an egg for breakfast was too much, and that their tea, on the other hand, was not such a big meal as they were accustomed to: they proposed, then, that they should have the egg at tea-time instead of at breakfast. This we allowed. They also told us that they were not used to such a large supper as we gave them, and that the milk pudding alone, or with perhaps the addition of a little meat, would be quite sufficient for their evening meal. On the other hand, they considered that their dinner was too small a meal, and suggested that the greater part of their daily allowance of meat should be given to them at mid-day. As a matter of fact, we had intentionally



divided the daily allowance of meat equally between dinner and supper.

The separated milk was at first taken very irregularly. This, we found, was due to the men considering that it had no nutritive value, and that it was to be regarded much in the same light as water. When corrected on this point the separated milk was regularly taken, although it was never a very popular item of the diet. The men also appeared to have some difficulty in taking the prescribed amount of margarine. This was not due to any dislike to the margarine itself; indeed, the men generally expressed an opinion that the margarine was superior in flavour to the butter which they were accustomed to take when at home; the difficulty rather lay in their taking such an unaccustomed amount of fat, the working man, as previously stated, taking the bulk of his energy-giving food in the shape of carbohydrate. The puddings were very much appreciated. We gave puddings both at dinner and supper, whereas most of the patients were only used to having puddings once or twice a week.

The remaining criticism we have left to the last; being of the most importance it requires fuller consideration. This criticism was that the diet as a whole was scarcely large enough and did not always satisfy their hunger. To hear this was a great surprise to us, as the diet had been very carefully calculated, so as to secure an adequate nutritive value.


The diet was, as a matter of fact, thoroughly adequate from a nutritive standpoint. Indeed, as already stated, it was too large.

The fault of our diet as prescribed lay, not in any



deficiency of nutritive value, but rather in the way in which the nutritive value was given. We did not at the time, perhaps, fully appreciate the fact that the working man, in ordinary life, takes rather bulky meals. Two factors tend to make his diet a large one. In the first place, the large amount of actual muscular work he performs makes it necessary for him to take a larger amount of energy-giving foods than is required by any one engaged in a less active occupation, such as that of a clerk in an office. Further, for the sake of economy, as previously noted, he takes the greater part of his energy-giving food in the cheap but bulky form of carbohydrate rather than in the shape of fat which is less bulky and more expensive. It would appear that the working man, in consequence of this, becomes so used to taking bulky meals that a diet of smaller bulk, although giving him his usual amount of nourishment, fails somehow to satisfy him. From experimental data it appears that this type of hunger is more or less a subjective sensation due to absence of the usual bulk of food rather than hunger in the true sense of the term. The amount of solid matter ingested no doubt plays no small part in producing the feeling of satisfaction after a meal, but whatever the full explanation may be, the facts just mentioned have to be borne in mind when constructing diets for use by the working classes. We might add perhaps that the criticism just referred to was never made by men with poor appetites and digestions, indeed, by these patients, some concentration of the diet was very much appreciated.

Unfortunately, from the point of view of the



economics of our diet, we did not at the time realize the reason of the criticism which we have just given, and, in consequence, did not meet it with an appropriate remedy. The obvious remedy was to have increased the diet in its bulky food-stuffs of comparatively small nutritive value: this measure would have had the desired effect without appreciably altering the nutritive value of the diet. Instead of doing so, however, we increased the diet a good deal in meat and bread—(this was the patients' suggestion)—which resulted in the diet becoming a good deal more expensive and of higher nutritive value than was intended.

#### **Economic Efficiency of the Diet.**

We have now to consider the economic efficiency of the diet as actually taken by the patients in residence in the Cottage Sanatorium, or, in other words, whether the weekly sum spent upon the diet per head, viz. 16*d.*, was a reasonable one. We can get a good idea of the economic soundness of the Cottage Sanatorium diet by comparing its nutritive value and its cost with that of our standard economic diet for the average working man when in health and at work.

	<i>P.</i>	<i>Cals.</i>	<i>Cost.</i>	<i>No. of grammes Proteid bought.</i>	<i>No. of Cals. per penny spent.</i>
Standard economic diet . . . . .	120	3300	10 <i>d.</i>	12	330
Diet taken by patients in Sanatorium . . .	208	4400	16-14	12-9	272
Diet prescribed . . .	155-8	3448	12-18	12-8	284

It will be seen that the diet taken by the patients was fairly cheaply bought, each penny spent purchasing 12-9 grammes proteid and 272 calories. The

great difference between this diet and the other two lies in the excess of proteid it contains. As a matter of fact, the excess of proteid in this diet, as compared with the diet originally prescribed, almost entirely accounts for the extra cost of 4*d.* per day. The point then to be determined, is whether the excess of proteid was necessary. In our opinion the 156 grammes of proteid originally prescribed was ample for the patients' requirements, and the extra 52 grammes actually taken daily unnecessary.

The explanation of the diet actually taken by the patients being larger than that prescribed for them, has already been given, and we can only repeat that we made a mistake in increasing the patients' diet by adding more meat to it, instead of by the inclusion of a greater amount of bulky food-stuffs of low nutritive value. Inasmuch, then, as the diet actually taken by the patients included 52 grammes of proteid, costing 4*d.* a day, which was not really necessary, the diet was economically unsound.

Was the diet, apart from this extra proteid, in short as originally prescribed, economically sound? Certainly it was. With a little care, however, it could have been improved economically without impairing its efficiency. For example, the amount spent upon meat, milk, fish, and butter, might be somewhat reduced, and more use made of such cheap animal foods as bacon and cheese. Again, in view of the much greater cost of animal as compared with vegetable food, the diet might have contained less meat and more vegetable food.

We are of the opinion that in a diet for the working classes, the amount spent upon animal food should not

exceed 70 % of the total expenditure. In our diet, as originally prescribed, the amount spent upon animal food amounted to 80 % of the whole cost. So long as meat is relied upon as a chief source of proteid in a diet such as we prescribed at the Cottage Sanatorium, it cannot be a very cheap one. The alternative is to make use of such valuable sources of proteid as peas, beans, &c. These food stuffs, it may be noted, we did not use at all. Oatmeal, too, we did not make as much use of as we might have done. Our dietetic work at the Mundesley Cottage Sanatorium, in short, showed us that to construct a really cheap and efficient dietary, it is necessary to make a reasonable use of vegetables as a source of proteid.

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## CHAPTER VI

### OBSERVATIONS ON THE TREATMENT OF CONSUMPTIVES WITH MEAT-FREE DIETS

THE results of our dietetic observations at the Cottage Sanatorium clearly indicated that we should undertake a further series of observations with a view to determining to what extent it is possible or advisable to substitute vegetable food-stuffs as cheap sources of proteid for meat and other expensive proteid foods.

In this chapter we shall give an account of our experience in treating consumptives on an entirely meat-free diet.

We would point out that it was not our intention to prescribe a strictly vegetarian diet, for such dietaries have been shown by many observers, from Voit onwards, to be less satisfactory than the ordinary mixed diet from a physiological standpoint.

For this reason such sources of animal proteids as milk and eggs were made use of. The important feature of the diet used lay in the fact that meat was entirely replaced by proteid from vegetable sources. We might also say that since we only had this one point in view, viz. the testing of the efficiency of vegetable proteid in the treatment of consumption, we made no particular effort to construct the dietary on very cheap lines.

**Method of Observation.**—The patients observed were



carefully selected and were treated in two chalets in the grounds of the Mundesley Sanatorium. In every case we explained to the patients before they were admitted the objects of our observations, and the lines upon which this research would be carried out.

To compensate for any inconvenience they might be put to, as a result of our work, we gave them their treatment free of cost.

Throughout our observation these patients were under the close supervision of ourselves and of the nursing staff of the Sanatorium.

The diet consisted of milk, butter, bread, eggs, jam, oatmeal, rice, &c., cheese, peas, beans, and lentils. Tea, coffee, and other non-nutritive food-stuffs were also allowed. Special arrangements were made for the efficient cooking of the meals, and the whole of the food taken by each patient was accurately weighed or measured and entered in the daily report of each case. There is no doubt that the patients took the diet as recorded and nothing else. The meals consisted of breakfast, consisting of porridge and an egg, bread, butter, &c. Dinner and supper of pulses variously prepared, milk pudding, &c., and tea of bread, butter, jam, &c.

The results of our observations being of considerable importance, we propose to give a detailed report of the progress made by each patient treated on these lines.

CASE 1. Age 19 years. Cabinet-maker. Duration of treatment, 71 days.

*Type of Disease.* Infiltration of one apex.

This patient was selected for us by Dr. Kingston Fowler, under whose care he had been admitted to

Middlesex Hospital a fortnight before his admission to the Mundesley Sanatorium. We are indebted to Dr. Fowler for the following report taken at the time of his admission to the Middlesex Hospital:—

‘His family history is good and his previous medical history satisfactory. Symptoms of consumption first appeared in June, 1902, that is twelve months before admission, an attack of haemoptysis having been the first indication of the disease. Since that date he has had seven similar attacks, but except for short intermissions he has remained at work. The patient is of opinion that he must have lost several pints of blood in these attacks. During the six months previous to admission he has lost weight, become breathless, and more recently has suffered from night sweats, but has continued at work until a week before admission, when a severe attack of haemoptysis occurred.

‘On examination there is some flattening at the left apex and a few moist sounds are audible on coughing. There is also some loss of resonance at both apices posteriorly. The sputum is blood-stained and contains tubercle bacilli; the temperature ranges between 99° and 101°. He is in very poor general condition, being obviously emaciated and anaemic.’

When admitted to Mundesley a fortnight later his sputum was free from blood, but otherwise his condition was practically unchanged. His temperature ranged between 98·6° and 100·4°, and he had some night sweats. His weight was 124 lb. (55·8 kilos). His alimentary system was normal, but his appetite was poor; his stomach was normal in size, and there was no dyspepsia.

During the first four weeks the patient was kept at rest in the grounds, and the temperature gradually

fell. At the end of seven weeks his temperature was normal and he was walking a mile a day. Throughout his course of treatment he was treated upon an entirely meat-free diet. The following table shows his average diet during the 71 days he was under special observation :—

## MEAT-FREE DIETS.

**AVERAGE DIET TAKEN BY CASE No. 1 FOR 71 DAYS.**

<i>Food-stuffs.</i>	<i>Amount.</i>		<i>Nutritive value.</i>			<i>Cost.</i>
	<i>Gram.</i>	<i>Oz. (approx.)</i>	<i>Proteid.</i>	<i>Fat.</i>	<i>Car.-Hyd.</i>	<i>Pence.</i>
Whole Milk . .	2156	76	71.1	86.2	107.6	5.68
Meat . . . .	—	—	—	—	—	—
Butter . . . .	59	2	—	47.2	—	1.55
Cheese . . . .	—	—	—	—	—	—
Eggs . . . .	one	one	6.0	4.0	—	.66
Bacon . . . .	nil	—	—	—	—	—
Total Animal Food . .			77.1	187.4	107.6	7.89
Bread . . . .	297	10½	26.7	2.9	148.5	.81
Potatoes . . . .	—	—	—	—	—	—
Oatmeal . . . .	47	1¾	7.5	3.8	81.7	.20
Peas, beans, &c.	249	8½	60.4	3.2	149.1	1.09
Sugar . . . .	24	1	—	—	24.0	.18
Jam . . . . .	32	3	.6	—	65.5	.63
Rice, &c. . . .	24	1	1.9	—	19.0	.10
Flour . . . .	—	—	—	—	—	—
Green vegetables	95	—	1.0	—	5.0	.10
Sundries . . . .	—	—	—	—	—	.30
Total Vegetable Food . .			98.1	9.4	442.8	3.36
Total Food . . . . .			175.2	146.8	550.4	11.25
No. of Calories bought per penny . 886 No. of Grammes of Proteid bought per penny . . . . . 15.5						
			Total Calorie value 4840			

It will be seen from this table that the amount of proteid taken daily, viz. 175 grammes, was very high, some 10 % higher than we consider necessary, and that the Calorie value of this diet was also on the high side.

The patient improved very rapidly upon this diet. General health rapidly improved, temperature fell, and the physical signs rapidly cleared up. He gained very rapidly in weight, in all 35 lb. in 72 days, or at the rate of  $3\frac{1}{2}$  lb. a week. His appetite, which was poor on admission, very soon improved, and throughout his course of treatment remained very good. He found very little difficulty in taking his diet, and it had no detrimental effect upon any part of his alimentary canal.


When discharged from Mundesley his general health was completely restored, and except for a slight cough and expectoration his tubercular symptoms had entirely cleared up. In the lungs there were no physical signs, except some impairment of resonance over the affected area. His weight was 11 stone, being a gain of 30 lb. (69.6 kilos), and he was walking six to eight miles daily. His stomach was carefully measured at the end of treatment and found to be quite normal.

*After-history.*—This patient returned to his home and has remained perfectly well ever since—a period of over four years.

At the present time he is still taking a diet which includes a large amount of vegetable proteid, and he tells us that he does so from choice.

CASE 2. Age 35. Carman. Duration of treatment, 83 days.

*Type of Case.*—Early disease of two lobes, with extensive dry pleurisy.



*History.*—This patient's disease had been insidious in onset—gradual loss of strength with failing of appetite and general health. He had continued at work however. Six weeks before his admission to Mundesley he had been admitted into the London Temperance Hospital, under the care of Dr. Porter Parkinson, suffering from acute pleurisy. We are indebted to Dr. Parkinson for the following report of his condition at that time.

‘His symptoms were acute, the temperature ranging between 99.5° and 101°, associated with the usual signs of acute dry pleurisy. After a month's treatment the temperature had fallen considerably, but signs of lung disease were now evident.’

On admission to Mundesley Sanatorium he had signs of early disease at the right apex, and extensive dry pleurisy of the left pleura, which made it difficult to determine the exact condition of the lung itself, though recent infiltration of both lobes was suspected. He was of good physique, though in very poor condition, being obviously emaciated and anaemic. His weight was 10 st. 9 lb., or 13 lb. below his highest known weight. His temperature ranged between 99.4° and 100.4°. His alimentary system appeared to be normal, but he had a poor appetite; the stomach was normal in size.

The diet given in the following table represents his average diet for 55 days. During the remaining 28 days that he was under observation he was given a fluid diet on account of an intercurrent affection, not tubercular in character.

## MEAT-FREE DIETS.

AVERAGE DAILY DIET TAKEN BY CASE No. 2 FOR 55 DAYS.

	Amount.		Nutritive value.			Cost.
	Gram.	Oz. (approx.)	Proteid.	Fat.	Car-Hyd.	Pence.
Whole Milk . .	2000	70	66.0	80.0	100.0	5.28
Meat . . . .	—	—	—	—	—	—
Butter . . . .	71	2½	—	56.8	—	1.86
Cheese . . . .	—	—	—	—	—	—
Eggs . . . .	one	one	6.0	4.0	—	.66
Bacon . . . .	—	—	—	—	—	—
Total Animal Food . .			72.0	140.8	100.0	7.80
Bread . . . .	263	9	23.8	2.6	132.5	.72
Potatoes . . . .	—	—	—	—	—	—
Oatmeal . . . .	50	2	8.0	3.6	33.7	.22
Peas, beans, &c.	200	7	48.6	2.6	120.6	.87
Sugar . . . .	40	1½	—	—	40.0	.22
Rice, &c. . . .	23	1	2.2	—	22.4	.12
Jams, &c. . . .	59	2	.5	—	47.2	.46
Flour . . . .	—	—	—	—	—	—
Green vegetables	95	—	1.0	—	5.0	.10
Sundries <sup>1</sup> . . . .	—	—	—	—	—	.30
Total Vegetable Food . .			84.1	8.8	401.4	3.01
Total Food . . . . .			156.1	149.6	501.4	10.81
No. of Calories bought per penny . 378						
No. of Grammes of Proteid bought . . . . . 14.4						
Total Calorie value 4085						

<sup>1</sup> Entirely non-nutritive.

This patient was kept at complete rest for the first five weeks of his treatment. During this period he rapidly improved in every respect. His temperature fell to normal, and he gained weight steadily at the rate of 3 lb. a week; the condition of his lungs also

appreciably improved. He was then put on walking exercise, which was steadily increased until he was walking eight miles daily. His subsequent progress was most satisfactory and uneventful, except that an abscess formed in the abdominal wall—apparently a breaking-down gumma, which had to be treated surgically. When discharged, after three months' treatment, in August, 1903, his general health was completely restored. In the lungs the physical signs had almost entirely cleared up, and what remained suggested fine pleural adhesions with some thickening of the pleura over the areas originally affected. He had gained 20·6 lb. in weight (9·8 kilos), and reached his highest known weight before contracting tuberculosis. After the first week's treatment until the date of his discharge this patient experienced no difficulty whatever in taking his diet, and throughout his course of treatment the alimentary canal remained in good condition. At the time of his discharge this patient's stomach was measured and found to be normal.

*After-history.*—On discharge from Mundesley he obtained work as a coachman in the country. At the present time, viz. four years since the date of his discharge, he is in excellent health and at work; indeed, he has not lost a day's work through illness since he left us.


CASE 3. Clerk. Duration of treatment, 63 days.

*Type of Disease.*—Fibro-caseous disease of some years' standing; recent reactivity after three years' complete arrest.

*History.*—This patient has a very bad family history, both parents having died of consumption.

His paternal grandfather, a maternal aunt, two first cousins, and a half-sister (the same father) had also died of the same disease. A brother had also died in infancy of meningitis. His tuberculous history dated from a considerable period previous to his admission to the Mundesley Sanatorium. For some years past he had had winter cough, and the first definite symptom of tuberculosis, viz. haemoptysis, had appeared three years before he came to Mundesley. This haemoptysis was not a very severe attack, and he returned to work within a few days of his sputum clearing. Consumption was not diagnosed until twelve months later, and meanwhile he had enjoyed very fair health and continued his work. Subsequently his winter cough had been more marked and associated with general ill-health, but he recovered again in the summer. In the spring of the year of admission (1903) this winter cough had not cleared up as usual, and his general health had become very much worse. He then developed characteristic tubercular symptoms, viz. cough and expectoration, night sweats, weakness, &c. He continued to work, however, being unwilling to throw up his appointment. In May, 1903, his condition was practically unchanged, and he then applied for admission to the Sanatorium.

*Condition on Admission.*—When admitted the condition of his lungs was a good deal more satisfactory than one had expected from his history. Physical examination gave evidence of old-standing but fairly limited disease in the upper and lower lobes of both lungs, the signs everywhere suggesting a considerable degree of arrest and fibroid change, but there was some activity at both apices. The general physique





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was fair, though his chest was of the typical flat type. His general condition was very poor, night sweats being fairly constant, but he was practically afebrile. His weight was 8st. 2 lb. (51.6 kilos); his previous highest weight was unknown.

### MEAT-FREE DIETS.

DIET OF CASE NO. 3 DURING A PERIOD OF 63 DAYS.

Food-stuffs.	Amount.		Nutritive value.			Cost.	
	Gram.	Oz. (approx.)	Proteid.	Fat.	Car.-Hyd.	Pence.	
Whole Milk . . .	1492	52½	49.2	59.6	74.6	3.98	
Butter . . . . .	50	2	—	40.4	—	1.81	
Meat . . . . .	94	3½	16.3	11.2	—	1.24	
Fish . . . . .	98	3½	9.3	1.2	—	.88	
Cheese . . . . .	—	—	—	—	—	—	
Eggs . . . . .	one	one	6.0	4.0	—	.66	
Bacon . . . . .	—	—	—	—	—	—	
Total Animal Food . .			81.3	116.4	74.6	7.97	
Bread . . . . .	311	11	28.0	3.1	155.5	.85	
Potatoes . . . . .	70	2½	1.3	—	10.2	.09	
Oatmeal . . . . .	45	1½	7.3	3.2	30.4	.19	
Peas, beans, &c. . .	180	6	43.7	2.3	108.8	.79	
Sugar . . . . .	8	—	—	—	8.0	.04	
Rice, &c. . . . .	22	¾	1.3	—	17.3	.09	
Jam, &c. . . . .	58	2	.5	—	46.7	.44	
Flour . . . . .	—	—	—	—	—	—	
Green vegetables . .	—	—	1.0	—	5.0	.10	
Sundries . . . . .	—	—	—	—	—	.30	
Total Vegetable Food . .			83.6	8.6	381.9	2.89	
Total Food . . . . .			164.9	125.0	456.5	10.86	
No. of Calories bought per penny . . 341 No. of Grammes of Proteid bought per penny . . . . . 15.1							Total Calorie value. 3710

*Alimentary System.*—His appetite was poor and he was liable to attacks of flatulent dyspepsia.

The preceding table shows the diet he took during the 63 days he was under observation and for some weeks afterwards.

It will be noticed that a small amount of meat and fish was given. This was due to the fact that as this patient was the first to whom we had prescribed a largely meat-free diet, we did not cut off the meat and fish entirely, but were content to reduce them to small amounts. The amount of meat and fish prescribed, however, was so small in comparison with the amount of pulse, that we feel quite justified in including this patient in the reports on those treated on meat-free diets.

This patient found it difficult to take the amount of pulses prescribed for him. He had a bad appetite, and found the diet monotonous, being accustomed to an ordinary diet containing a large amount of meat. He improved considerably under treatment, however, and gained weight steadily at the rate of about 2 lb. a week. He soon lost his night sweats, and the physical signs in the lungs rapidly improved. During the first five weeks of his treatment he suffered a good deal from dyspepsia, a certain amount of heartburn being frequent; the tongue, however, was always fairly clean. He also suffered now and again from some degree of abdominal distention. All these symptoms were more noticeable towards night. After the first five weeks, however, these symptoms, though they never entirely disappeared, became very much less marked. He was then taking a considerable amount of walking exercise and was in much better

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general health. When discharged his health was very considerably restored and the disease of the lung greatly improved. He had gained 20 lb. in weight and was walking some six miles daily.

*After-history.*—This patient continued his treatment for some months longer after his discharge from the Sanatorium and then resumed work as a clerk, having found a situation in the country. He has enjoyed perfect health ever since, and, at the present date, over four years later, he is in perfect health and doing a full day's work. He has not missed a day's work on account of ill-health since leaving Mundesley.

### **Commentary on Cases 1, 2, and 3.**

These three patients were then all most successfully treated upon a meat-free diet. Clinically, these three patients represented well-marked phases of pulmonary tuberculosis.


Case 1 was a patient with early disease of one apex, associated with slight fever and a good deal of emaciation.

Case 2 was a patient with recent but fairly extensive infiltration, associated with a good deal of fever and emaciation.

Case 3 was a patient with somewhat extensive, slowly progressive, disease of long standing, associated with very poor general health.

In each case as a result of treatment general health was completely restored and the lung disease fairly completely arrested.

We have no doubt that these three patients did quite as well upon the meat-free diet as they would have done on an ordinary mixed diet; indeed, the



progress of these three patients could not have been more satisfactory. The gain of weight in each case was rapid, somewhat more rapid, in short, than usual, but it must be remembered that all the patients were considerably below their normal weight. The average gain of weight of these patients was three pounds a week during an average period of 72 days, and the total gains in weight were 30 lb., 20.6 lb., and 20 lb. respectively.

The table upon the next page summarizes the chief points of interest in the treatment of these patients.

In that table it is seen that the average diet taken by these three patients was: proteid 165.4, fat 140.5, carbo-hydrate 502.8, giving a Calorie value of 4045. The proteid value of these diets is high, somewhat higher indeed than we ordinarily prescribe for the average consumptive. The Calorie value was also high, perhaps higher than necessary. The diets generally, in short, were of rather a high nutritive value.

#### **Effect of the Diets upon the Alimentary Canal.**

As we have already noted, two of the patients took this large diet without any difficulty and did not suffer in the least from any loss of appetite or indigestion. The third patient, however, who had naturally rather a poor appetite and digestion, suffered a good deal from indigestion, especially during the earlier part of his treatment, but this became very much less marked when he was able to take a fair amount of exercise. The absolute bulk of these diets is very noticeable, their average daily weight being 4011 grammes or 15 lb. The weight of the diet we

NUTRITIVE VALUE OF DIET.

No. of Case.	No. of days under observation.	Proteid.	Fat.	Carbo-hydrate.	Calories.	% Animal Proteid.	% Vegetable Proteid.	Weight of food taken daily, in grammes.	Weekly gain in Weight.	Total gain in Weight.	Cost in Pence.
1	71	175.2	146.8	550.5	4940	44	56	4881	3.5 lb.	80 lb.	11.26
2	83	166.1	149.6	501.4	4085	46.1	53.9	4176	3.4 lb.	20.6 lb.	10.81
3	68	164.9	125.0	456.5	3710	48.8	51.7	3897	2.0 lb.	20 lb.	10.86
Average	72	165.4	140.5	502.8	4045	46.1	53.9	4011	3 lb.	28 lb.	10.97

prescribed for the Sanatorium was 10 lb. To summarize then, these three meat-free diets were bulky, had an adequate nutritive value, and proved very efficient from a clinical standpoint.

CASE 4. Age 19. Fishmonger. Duration of treatment, 105 days.

*Type of Case.*—Chronic fibro-caseous disease with some degree of arrest.

*History.*—This patient had been quite well until Christmas, 1902. He then had an attack of bronchitis which laid him up for two months, and on his return to work in February, 1903, he still had a cough. Two months later pulmonary tuberculosis was diagnosed, and he then commenced attending Brompton Hospital as an out-patient under Dr. Latham. He failed to improve as an out-patient, and a month later was admitted as an in-patient under Dr. Maguire (June 10). His disease at that time was limited to the right lung, and not very active; he had slight fever, the temperature ranging between 98° and 99°, but he had no acute symptoms; his appetite and digestion were poor, and his weight 8 st. 12 lb., being 14 lb. below his highest known weight.

A fortnight after admission he had an acute exacerbation, the temperature ranging between 100° and 103°, and from that time it fell very slowly till it reached a range of 98° to 99°. During the eight weeks he was at Brompton, his weight remained constant at 8 st. 12 lb., and neither his lungs nor his general condition improved at all. When admitted to Mundesley Sanatorium he was found to have disease of all five lobes, the physical signs suggesting but little activity and a considerable degree of fibrosis, especially in

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the right lung. His temperature ranged between 97.6-99°. He had a great deal of cough, and his sputum averaged 75 cc. (3 oz. daily). His circulation was feeble, and his general health very poor. His alimentary system was definitely impaired; his appetite was consistently bad, and from time to time he suffered a good deal from flatulent dyspepsia. There was no evidence of any organic disease in the intestines, and the stomach was normal in size. On admission to Mundesley Sanatorium we thought it advisable to try to improve his general condition and circulation by gentle exercise, and he was prescribed two miles walking daily.

The average diet taken by this patient during a period of 47 days after admission is shown in the table on the next page.

This patient failed to make any appreciable improvement under treatment. He found it quite impossible to take as large a diet as was regularly taken by the three patients whose records we have just given, although we encouraged him as much as possible, and he, on his part, made a great effort to do so. His appetite failed to get any better, and generally his condition, after his first six weeks' treatment, remained about the same. As a result of his inability to take his prescribed diet, the nutritive value of his daily dietary was inadequate. As will be seen from the table the average nutritive value of his diet for the first 47 days was 118.7 grammes of proteid and 2596 Calories, an amount, in our experience, inadequate for the efficient treatment of such a case. The deficiency in proteid was especially marked. We might add that though his appetite did not improve,

## MEAT-FREE DIETS.

AVERAGE DIET (1) TAKEN BY CASE NO. 4 FOR A PERIOD OF 47 DAYS.

<i>Food-stuffs.</i>	<i>Amount.</i>		<i>Nutritive value.</i>			<i>Cost.</i>
	<i>Gram.</i>	<i>Oz. (approx.)</i>	<i>Proteid.</i>	<i>Fat.</i>	<i>Car.-Hyd.</i>	<i>Pence.</i>
Whole Milk . .	1589	56	52.5	63.6	79.5	4.20
Meat . . . .	—	—	—	—	—	—
Butter . . . .	83	1	—	26.4	—	.86
Cheese . . . .	—	—	—	—	—	—
Eggs . . . .	one	one	6.0	4.0	—	.66
Bacon . . . .	—	—	—	—	—	—
Total Animal Food . .			58.5	94.0	79.5	5.72
Bread . . . .	93	3½	8.3	.9	46.5	.25
Potatoes . . .	—	—	—	—	—	—
Oatmeal . . . .	30	1	4.8	2.1	20.2	.13
Peas, beans, &c.	186	6½	45.2	2.4	112.2	.76
Sugar . . . .	16	½	—	—	16.0	.08
Jam . . . .	—	—	—	—	—	—
Rice, &c. . . .	12	½	.9	—	9.6	.05
Flour . . . .	—	—	—	—	—	—
Green vegetables	—	—	1.0	—	5.0	.10
Sundries . . . .	—	—	—	—	—	.30
Total Vegetable Food . .			60.2	5.4	209.5	1.67
Total Food . . . . .			118.7	99.4	289.0	7.39
No. of Calories bought per penny . 351						
No. of Grammes of Proteid bought . . . . . 16.0						
Total Calorie value 2596						

it did not become any worse, neither did he suffer any more than usual from dyspepsia. From a clinical standpoint, then, the meat-free diet in this case was a failure, inasmuch as the patient was unable to take enough of it to secure an adequate nutritive value. It is useless to speculate as to how he would have done



if, as in the case of the other patients, he had been able to take enough of the food prescribed to give the requisite nutritive value, viz. 150 grammes proteid and 3800 calories daily. This task was certainly beyond the powers of the patient, and if attempted on his

## MEAT-FREE DIETS.

**AVERAGE DIET (2) TAKEN BY CASE NO. 4 FOR A PERIOD OF 58 DAYS.**

<i>Food-stuffs.</i>	<i>Amount.</i>		<i>Nutritive value.</i>			<i>Cost.</i>
	<i>Gram.</i>	<i>Oz. (approx.)</i>	<i>Proteid.</i>	<i>Fat.</i>	<i>Car.-Hyd.</i>	<i>Pence.</i>
Whole Milk . .	1568	55	51.7	62.7	78.4	4.15
Meat . . . .	186	6½	35.4	22.4	—	2.48
Fish . . . .	96	3½	9.6	1.3	—	.85
Butter . . . .	48	1¾	—	38.4	—	1.26
Cheese . . . .	—	—	—	—	—	—
Eggs . . . .	one	one	6.0	4.0	—	.66
Bacon . . . .	24	1	1.9	10.1	—	.81
Total Animal Food . .			102.6	188.9	78.4	9.71
Bread . . . .	220	8	19.8	2.2	110.0	.60
Potatoes . . . .	99	3½	1.8	—	14.7	.18
Oatmeal . . . .	24	1	38	1.7	16.2	.10
Peas, beans, &c.	—	—	—	—	—	—
Sugar . . . .	18	½	—	—	18.0	.06
Jam . . . .	—	—	—	—	—	—
Rice, &c. . . .	8	¼	.6	—	6.4	.08
Flour . . . .	—	—	—	—	—	—
Green vegetables	—	—	1.0	—	5.0	.10
Sundries . . . .	—	—	—	—	—	.80
Total Vegetable Food . .			27.0	8.9	165.3	1.32
Total Food . . . . .			129.6	142.8	243.7	11.08
No. of Calories bought per penny 259 No. of Grammes of Proteid bought per penny . . . . . 11.7						
				Total Calorie value 2358		

part, would certainly have ended in serious digestive trouble.

At the end of the first 47 days' treatment, it was clear that the meat-free diet was not a satisfactory one for this patient, so he was prescribed an ordinary mixed diet instead. The diet taken by him during the next 58 days is shown on the preceding page.

The average nutritive value of this second diet was 130 grammes of proteid and 2858 calories, still too low for the efficient treatment of his disease. He was able, however, to take the diet much more easily than the meat-free diet, since it was more palatable and of considerably less bulk. Its weight with liquids was 2797 grammes, compared with 3047 grammes, the weight of the meat-free diet.

During the 58 days he was on this diet the patient made distinct progress, his general health improved, and his appetite certainly became better; his weight, however, remained stationary. In the lungs there was also some slight improvement. From a clinical point of view the progress of this patient on the second diet was still very unsatisfactory, and we doubt very much whether he would have made any appreciable improvement upon any treatment that could have been prescribed for him.

From the first this patient showed that he had a very low degree of resistance to tuberculosis. While under treatment in the Brompton Hospital he failed to improve at all, although the disease at that time was only of six months' duration and limited to one lung. His appetite was always poor and his general condition unsatisfactory. It was hoped that the change to Mundesley would prove a stimulus and improve his general condi-

tion, especially his appetite, but this was not realized. The patient died within twelve months of his discharge.

CASE 5. Age 27. Farm labourer. Duration of treatment, 72 days.

*Type of Case.*—Extensive chronic fibro-caseous disease.

*History.*—The history of this patient was as follows: Cough had first commenced two years before admission; he had, however, remained at his work for another eighteen months; at that date he was compelled by ill health to give up his work on the farm and obtained an easy post as odd man in a large country house. He continued to lose ground, however, increasing dyspnoea and cough with steady loss of weight being his chief symptoms. On admission he was found to have very extensive chronic disease of both lungs, associated with considerable fibroid change, some emphysema and general bronchitis. He was very weak and anaemic and obviously emaciated, his weight being 35 lb. below normal. His cough was very troublesome and disturbed his sleep; his temperature ranged from 99° to 100·5°, and he suffered a great deal from night sweats. His appetite was very bad, and he suffered a great deal from flatulent dyspepsia, with occasional attacks of vomiting. This patient was prescribed a meat-free diet, and the average diet he actually took during the 72 days he was under treatment is shown on page 133.

From the table it is seen that this patient was only able to take 125 grammes of proteid daily, an amount which, in our opinion, was not sufficient. He was kept at absolute rest in the open air for the first fortnight after admission, and his temperature steadily

## MEAT-FREE DIETS.

AVERAGE DIET TAKEN BY CASE NO. 5 FOR A PERIOD OF 72 DAYS.

Food-stuffs.	Amount.		Nutritive value.			Cost.
	Gram.	Oz. (approx.)	Proteid.	Fat.	Car.-Hyd.	Pence.
Whole Milk . .	1491	52½	49.3	59.6	74.5	3.83
Meat . . . .	—	—	—	—	—	—
Butter . . . .	51	2	—	40.8	—	1.84
Cheese . . . .	—	—	—	—	—	—
Eggs . . . .	one	one	6.0	4.0	—	.66
Bacon . . . .	—	—	—	—	—	—
Total Animal Food . .			55.3	104.4	74.5	5.83
Bread . . . .	182	6½	16.4	1.8	91.0	.49
Potatoes . . .	—	—	—	—	—	—
Oatmeal . . .	80	1	4.8	2.1	20.2	.18
Peas, beans, &c.	195	7	47.4	2.5	117.6	.88
Sugar . . . .	28	1	—	—	28.0	.12
Jam . . . .	80	1	.2	—	24.0	.23
Rice, &c. . . .	9	¼	.7	—	6.2	.04
Flour . . . .	—	—	—	—	—	—
Green vegetables	—	—	1.0	—	5.0	.10
Sundries . . .	—	—	—	—	—	.30
Total Vegetable Food . .			70.5	6.4	292.0	2.29
Total Food . . . . .			125.8	110.8	366.5	8.12
No. of Calories bought per penny . 376						
No. of Grammes of Proteid bought . . . . . 15.5						
Total Calorie value 8049						

fell to a range of 98° a.m. and 99.5° p.m.; he was then allowed some walking exercise. After a month's treatment he was distinctly better, his temperature remained at the lower range, and he was walking three miles daily. When discharged, after 72 days'

treatment, he was appreciably better than when first admitted. His temperature was normal, and he was able to walk five miles a day without fatigue. He was much stronger, and the night sweats had entirely disappeared. He had gained  $7\frac{1}{2}$  lb. in weight, but for some weeks his weight had been stationary at some 2 st. below his normal weight. His appetite was much better; he had less dyspepsia, and had had no vomiting since admission.

In spite of this general improvement there was no appreciable improvement in the condition of his lung disease.

This patient was a very difficult type of case to benefit permanently, and on the whole he did very fairly well. If he had been prescribed an ordinary mixed diet, he would probably have been able to take a diet of higher nutritive value, especially as regards proteid, which might have resulted in a greater gain in weight, and a greater degree of improvement in the lung disease.

CASE 6. Age 25. Laundryman. Duration of treatment, 21 days.

*Type of Case.*—Extensive chronic disease, with considerable fibroid change.

*History.*—This patient had suffered from consumption for some eighteen months. When admitted he was suffering from extensive chronic disease in both lungs. He was afebrile, and had no symptoms of active disease. His general health was fair, and he was able to walk several miles a day without fatigue. He was obviously much below his proper weight, his circulation was poor; he had definite clubbing, and suffered a good deal from dyspnoea on exertion. His

appetite was bad, and he suffered from dyspepsia. This patient was prescribed the meat-free diet, and the following table represents the average diet he managed to take during the 21 days he was under treatment. This diet, with a proteid value of 120 grammes and a Calorie value of 2761, was inadequate,

## MEAT-FREE DIETS.

AVERAGE DIET TAKEN BY CASE No. 6 FOR 21 DAYS.

<i>Food-stuffs.</i>	<i>Amount.</i>		<i>Nutritive value.</i>			<i>Cost.</i>
	<i>Gram.</i>	<i>Oz. (approx.)</i>	<i>Proteid.</i>	<i>Fat.</i>	<i>Car.-Hyd.</i>	<i>Pence.</i>
Whole Milk . .	1580	55½	52.1	68.2	79.0	2.78
Meat . . . .	—	—	—	—	—	—
Butter . . . .	29	1	—	23.2	—	.75
Cheese . . . .	—	—	—	—	—	—
Eggs . . . .	one	one	6.0	4.0	—	.66
Bacon . . . .	—	—	—	—	—	—
Total Animal Food . .			58.1	90.4	79.0	4.19
Bread . . . .	101	3½	9.0	1.0	50.5	.27
Potatoes . . . .	—	—	—	—	—	—
Oatmeal . . . .	30	1	4.8	2.1	20.2	.13
Peas, beans, &c.	193	7	47.0	2.5	116.4	.87
Sugar . . . .	32	1	—	—	32	.14
Jam . . . .	30	1	.2	—	24.0	.23
Rice, &c. . . .	10	½	.8	—	7.9	.04
Flour . . . .	—	—	—	—	—	—
Green vegetables	—	—	1.0	—	5.0	.10
Sundries . . . .	—	—	—	—	—	.30
Total Vegetable Food . .			62.8	5.6	256.0	2.07
Total Food . . . . .			120.9	96.0	335.0	6.26
No. of Calories bought per penny . 441 No. of Grammes of Proteid bought per penny . . . . . 19.1						
Total Calorie value						2761

## 136 TREATMENT OF CONSUMPTIVES

but the patient was quite unable to take a larger amount of the meat-free diet prescribed him. When discharged, after three weeks' treatment, his condition was practically unchanged, except for a gain in weight of 4½ lb. After these three weeks' trial of the meat-free diet, it was clear that the patient could not take enough of it to secure him a diet of adequate nutritive value, so the observations were discontinued.

### **Commentary upon Cases 4, 5, and 6.**

Patients Nos. 4, 5, and 6 were all cases of extensive chronic disease of considerable duration. The prognosis in each case was very unfavourable, and the possibilities of bringing about arrest of the disease and restoration to health were very small. All that could have been looked for was some temporary improvement as shown by considerable gain in weight and strength, and diminution of physical signs. This degree of success was not attained.

As we shall point out when discussing their diets, they did not take as much food as they required. If they had been prescribed an ordinary, somewhat concentrated diet, including a good deal of animal proteid, they would probably have done somewhat better. Reviewing the average diet actually taken by these three patients, it will be noticed that its average nutritive value was a good deal lower than that we consider to be necessary for the efficient treatment of consumption.

As shown in the next table, it worked out at proteid 121.8, fat 102.1, carbohydrate 330.2, Calories 2802.

## NUTRITIVE VALUE OF DIET.


No. of Case.	No. of days under observation.	Proteid.	Fat.	Carbo-hydrate.	Calories.	% Animal Proteid.	% Vegetable Proteid.	Weight of food taken daily, in grammes. <sup>1</sup>	Weekly gain in Weight. <sup>2</sup>	Total gain in Weight.	Cost in Pence.
4	47	118.7	99.4	289.0	2596	49.2	50.8	8047	stationary	nil	7.39
5	72	125.8	110.8	866.5	3049	43.9	56.1	8160	.7 lb.	5 lb.	8.11
6	21	120.9	96.0	335.0	2761	48.0	52.0	3111	1.7 lb.	4½ lb.	6.26
Average	47	121.8	102.1	330.2	2802	47.0	53.0	3106	.8 lb.	8.16 lb.	7.25

<sup>1</sup> Weight of food as taken, including such liquids as tea.<sup>2</sup> Weekly gain of Weight until Normal Weight is regained.



The proteid value of this average dietary was 25 % less than we should ordinarily prescribe for patients with extensive tubercular disease. The Calorie value of the diet, viz. 2802, was also distinctly too low. These patients certainly gained a little weight upon the diet, but this was not of very great significance, since all three were very much below their proper weights ; as a matter of fact the gains in weight were not so great as one would expect when treating similar patients upon an ordinary mixed diet. One very striking point was brought out by the comparison between the diet taken by the first three patients and that by the second three patients, viz. the difference in the bulk of food taken daily. In the case of the first three patients, who all had good appetites and digestions, the average intake of food daily was 4011 grammes. In the case of the three patients with bad appetites and digestions the average intake was 3106 grammes daily. In other words, the three patients with bad appetites and digestions on the average ate 905 grammes' weight of food less than the patients with good digestions. To this inability to take a sufficiently large bulk of food to ensure the ingestion of an adequate nutritive value, the failure of the meat-free diet, in the case of patients with bad appetites and digestions, must be chiefly attributed. We are perfectly convinced that it was a physical impossibility for these patients to take a diet of a larger bulk without producing serious disorder of the alimentary tract.

We can summarize, then, the results of attempting to treat patients with poor appetites and digestions with a bulky meat-free diet as follows. The patients were unable to take sufficient food



material to give them an adequate diet. The diet actually taken, although inadequate for the efficient treatment of advanced consumption, was sufficiently satisfactory to produce some degree of improvement, as evidenced by a slight gain in weight and some improvement in general health.

Case No. 4 was of especial interest, owing to the fact that he was treated upon the meat-free diet for 47 days and upon the meat diet for 58 days subsequently. The following is the nutritive value of the two diets:

	<i>P.</i>	<i>F.</i>	<i>C.-H.</i>	<i>Cals.</i>	<i>No. of days.</i>
(1)	119	99	289	2596	47
(2)	129.6	142.8	244	2858	58


The first diet contained 6½ oz. of pulses, which were replaced in the second diet by 6½ oz. of meat, 3½ oz. of fish, 4½ oz. of bread, and 1 oz. of bacon. There is not a great difference either in proteid or Calorie value between these two diets. The essential difference between the two lay in the proportion of animal and vegetable proteid which they contained.

We have already stated in the detailed record of Case 4 that this patient failed to improve at all upon the meat-free diet, but made some slight progress upon the second diet, although he failed to gain any weight in either case. It seems quite possible that the improvement noticed when the patient was treated upon the ordinary meat diet may have been directly due to the animal proteid contained in the diet; on the other hand, we must remember that the patient was probably in a more satisfactory general condition when he commenced taking this diet as a result of his

treatment for forty-seven days upon the meat-free diet.

**Conclusions as to the value of Meat-free Diets for Patients with Pulmonary Tuberculosis.**

The results which we obtained with these meat-free diets are certainly instructive, and help us to form some opinion as to the value of vegetable proteid in the treatment of pulmonary tuberculosis. Our observations were not sufficiently extensive to allow of our speaking in any dogmatic way upon such an important point, but our results certainly give some fairly clear indications. We might say that the six cases observed upon the meat-free diets were carefully selected as representing characteristic phases of consumption, viz. (1) patients with early disease and unimpaired appetites and digestions, and (2) patients with extensive chronic disease with impaired appetites and digestions. We can certainly state with confidence that the three patients with normal alimentary systems who were able to take a sufficient amount of the meat-free diet to give them a diet of a thoroughly adequate nutritive value, did extremely well. In each case the progress towards complete recovery could not have been better. The gain in body weight and strength and the clearing up of physical signs were just as rapid as we should have expected if ordinary meat diets had been prescribed. The fact that these three patients have maintained their health for the four years that have now elapsed since their discharge is evidence that the arrest of the disease was indeed as thorough as it appeared when they left Mundesley.



In the treatment, then, of patients with early or comparatively early disease, with good digestions, our experience is that proteid from vegetable sources is just as valuable from a clinical point of view as proteid from animal sources.

The treatment of patients with advanced disease and poor appetites and digestions was not satisfactory. Our three patients of this type found great difficulty in taking the meat-free diet, and, as already stated, they could not take the amounts which were prescribed for them.

It may occur to the reader that the idea of a meat-free diet, in other words, the efficacy of pulses as a source of proteid in place of meat, is no new thing, but, on the contrary, as old as the time of the prophet Daniel. The experiment was tried by the four men of Judah when they refused the king's meat and wine, and insisted on a diet of pulse.

'So he consented to them in this matter, and proved them ten days. And at the end of ten days, their countenances appeared fairer and fatter in flesh than all the children which did eat the portion of the king's meat.'<sup>1</sup>

#### **The Advantage of a Meat-free Diet.**

The great advantage of a meat-free diet is its small cost. For example. The meat-free diet taken by patient 1, which had a nutritive value of proteid 175, fat 146, carbohydrate 550, cost 11*d.* a day. If all the proteid given in the form of pulse in this diet had been replaced by proteid in the shape of meat, the cost of the diet would have been increased to 17*d.* a day, an extra cost of 55 %.

<sup>1</sup> Daniel i. 8-16.

**Disadvantages of the Meat-free Diet.**

There are certain serious disadvantages in an entirely meat-free diet. In the first place, a diet such as we used, namely one in which the proteid is given chiefly in the form of pulse, is, of necessity, of a bulky character.

The large bulk of these meat-free diets, as compared with a diet containing a similar amount of proteid from animal sources, is due to the fact that although uncooked meat and pulses have approximately the same proteid value, meat, in the process of cooking, loses water, whereas the pulses, by the time they are fit for eating, have taken up water to the extent of twice their own weight. For example, a sirloin contains in its uncooked condition roughly 20 % of proteid, but when cooked, owing to the loss of water, its proteid value rises to 28 %. On the other hand, the average percentage composition of pulses, as regards proteid, is about 23 % in the uncooked condition, but after the absorption of water during cooking, the percentage composition only averages some 8 % of proteid. To secure any given amount of proteid, a bulk of vegetable food is required some four times as great as would be necessary if animal food were used. This fact is a great practical obstacle to the more general use of vegetable proteid in dietaries for consumptives. It is sometimes found a difficult matter to get patients with normal appetites and digestions to take a sufficiently large diet when the pulses are relied upon as the source of proteid. This difficulty experienced in the case of patients with good appetites, &c., becomes a matter of impossibility when dealing with patients with marked anorexia,

Another disadvantage of these meat-free diets is the difficulty of making them sufficiently appetizing. To make a diet of pulses really palatable requires considerable skill in cooking, a skill which the average working-class housewife does not possess. Unless handled and varied with considerable care, a diet made up largely of pulses is somewhat insipid, and lacks the flavour and variety of the ordinary meat diet. Further, prejudice and custom, especially amongst the lower classes, are opposed to the adoption of a largely vegetable diet, but the feeling in favour of a meat diet is perhaps not so strong as it used to be.

Another objection to the use of a large quantity of pulses in a diet is the relatively low proportion of it which is absorbed in the alimentary canal as compared with the proportion of meat which is absorbed.

We were unfortunately unable to ascertain the exact amounts of the pulses absorbed in the case of our patients, but such evidence as we possess, viz. the gain in weight, which was rapid, the fact that the amount of nitrogen in the urine did not decrease compared with its excretion on an ordinary mixed diet, and the excellent clinical results obtained, indicate that at all events intestinal absorption was quite satisfactory.

Metabolic observations of a somewhat limited nature showed that in the case of patients with normal alimentary canals, these large meat-free diets did not give rise to any intestinal troubles; for instance, regular observation showed that at no time was there increased intestinal putrefaction.

To summarize, then, the results of our observations show that—

1. Vegetable proteid, as the main source of the daily intake of proteid in a diet for the tuberculous, is thoroughly satisfactory so long as a sufficient amount of it is taken.

2. The clinical results obtained when treating consumptives upon meat-free diets of an adequate nutritive value, are often quite as good as the results that are obtained when ordinary meat diets of similar nutritive value are used.

3. Owing to the bulky nature of a meat-free diet, its use is restricted to patients with normal, or approximately normal appetites and digestions, and is unsuitable for the treatment of those with marked impairment of the alimentary tract.

4. The use of vegetable proteid in the place of all the meat usually prescribed in an ordinary meat diet, effects an economy of some 33 %.

5. When economy is an object, the necessary proteid in a dietary should be given at least in part in the form of vegetable proteid. In the case of individuals with normal appetites and digestions, the meat of an ordinary mixed diet can be altogether replaced by pulses, but such an entirely meat-free diet is, on several grounds, not entirely satisfactory, and should not be used unless very strict economy is essential.

In the Appendix will be found a brief report by Dr. Ruth Wilson on her experience in the treatment of consumptives upon vegetarian diets. Dr. Wilson carried out her observations at the Salvation Army Sanatorium at Loughton, Essex, and at our request kindly wrote us an account of her work.

## CHAPTER VII

### OBSERVATIONS UPON TUBERCULOUS PATIENTS TREATED ON A DIET CON- TAINING A CONSIDERABLE PROPORTION OF VEGETABLE PROTEID AND AN AVER- AGE AMOUNT OF MEAT

#### I. OBSERVATIONS AT MUNDESLEY SANATORIUM.

ON the conclusion of our work with meat-free diets described in the last chapter, we constructed a dietary on the lines suggested by the results which we had obtained. Our object was to construct a diet of an adequate nutritive value which should be both palatable and economical. To secure these two essentials we made considerable use of vegetable proteid, but at the same time we gave a fairly ordinary amount of meat. For the purpose of economy separated milk and margarine were included. To test the efficiency of this diet, particulars of which are given in the table, we prescribed it for three patients; they all belonged to the working classes and were treated, as in the case of the patients treated on meat-free diets, in chalets in the grounds of the Mundesley Sanatorium. The general lines of their treatment and the methods of observation were also the same. In each case four meals were given daily, and the following table, giving a record of the meals actually taken by the patients during one day, shows very well their arrangement.



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<i>Breakfast.</i>	Tea, with 1 oz. of sugar. Porridge, containing 2 oz. of oatmeal and $\frac{1}{2}$ pint of milk. Bread, 3 oz. Margarine, 1 oz. Bacon, 2 oz. (weighed before cooking).
<i>Dinner.</i>	Beef, 4 oz. (cooked). Potatoes, 6 oz. (cooked). Greens, 5 oz. (cooked). Suet pudding, 5 oz. Bread, $1\frac{1}{2}$ oz. Milk, $\frac{1}{2}$ pint.
<i>Tea.</i>	Tea, with $\frac{1}{2}$ oz. of sugar. Bread, 4 oz. Margarine, $\frac{1}{2}$ oz. Jam, 2 oz.
<i>Supper.</i>	Pea soup, containing 3 oz. peas. Milk pudding, 5 oz. Margarine, $\frac{1}{2}$ oz. Bread, $1\frac{1}{2}$ oz. Milk, $\frac{1}{2}$ pint made into cocoa.

### CRITICISM ON THIS DIET.

This diet proved to be very satisfactory from every standpoint.

#### (a) **Clinical Efficiency.**

The clinical results obtained in the case of the three patients treated on this diet are briefly shown in the table on the next page.

The three patients were all favourable cases for treatment; two of them had only recent early disease, and the third, though he had suffered from tuberculosis of the lung for some years, had no symptoms of active disease; the physical signs in his lung, however, showed that the tubercular process was only quiescent. All three patients had normal appetites and digestions. Under treatment these patients steadily gained in weight at an average rate of  $1\frac{1}{2}$  lb. per week, and gained in all 10 lb., 14 lb., and 12 lb. respectively, gains

## CLINICAL RESULTS.

No. of Case.	Type of Disease.	No. of Lobes.	Age.	Condition on Admission.		Duration of treatment in weeks.	Condition on Discharge.		
				Appetite and Digestion.	Relation to H. K. W.		Clinical result.	Gain in weight.	Daily exercise.
1	Early disease with no fever	2	84	Good	-7 lb.	12	Complete arrest	10 lb.	10 miles
2	Early disease with no fever	1	80	Good	-10 lb.	12	Complete arrest	14 lb.	10 miles
3	Chronic disease of long standing with considerable degree of arrest	3	88	Normal	-11 lb.	16	Incomplete arrest A	12 lb.	7 miles

## DEFINITION OF TERMS USED.

*Complete arrest*: General health completely restored in every respect, and lung disease completely arrested (apparent cure), there being no physical signs present, or only such as are compatible with a completely healed lesion.

*Incomplete arrest A*: General health completely restored, but physical signs of lung disease, though much improved, not entirely cleared up, e.g. perhaps limited to a few moist sounds on cough.

H. K. W.: Highest known weight of patient before becoming infected with the disease.


which restored them their normal body weights. In every case, the condition of the lung disease and general health were immensely improved, and the two patients with early disease left apparently cured. From a clinical point of view, then, the diet was a pronounced success.

**(b) Nutritive Value. Palatability and Variety.**

The diet in these important respects was also highly satisfactory. Its nutritive value, viz. with a proteid value of 153 grammes daily and a Calorie value of 3634, was thoroughly adequate for the efficient treatment of pulmonary tuberculosis. The diet was very readily taken by the patients and much liked by them. We might add, however, that the food was always very carefully cooked, and considerable care was taken to vary the dishes day by day. When asked to criticize the diet, the patients suggested that the amount of milk given should be reduced and the amount of meat slightly increased. From a purely dietetic point of view, these were good suggestions, for their adoption would have resulted in the diet becoming more like that taken by the ordinary person in every-day life.

**(c) Economic Efficiency.**

It may be remembered that we adopted as our standard of an economic diet for the working classes when in health 'a diet adequate in every respect (e.g. from a nutritive standpoint, &c.) which costs 10d. a day and in which every penny spent buys some 12 grammes of proteid and some 300 Calories'. The diet now under consideration was, as we have already explained, thoroughly efficient from a nutritive standpoint; it



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DIET ACTUALLY TAKEN BY 3 MEN DURING AN AVERAGE PERIOD OF 26 DAYS.

Food-stuffs.	Amount.		Price Retail.	Nutritive value.			Cost. Pence.
	Ounces.	Grammes.		Proteid.	Fat.	Car.-Hyd.	
Separated Milk . .	42	1200	@ 1d. per pt.	40	3	60	2.11
Meat <sup>1</sup> . . . . .	7	200	@ 7d. per lb.	36	24	—	3.16
Suet . . . . .	$\frac{1}{2}$	16	@ 6d. per lb.	—	18	—	.18
Margarine . . . .	2	54	@ 8d. per lb.	—	43	—	1.00
Cheese (American) .	$\frac{1}{2}$	10	@ 7d. per lb.	3	4	—	.15
Egg . . . . .	—	—	—	—	—	—	—
Bacon . . . . .	2	56	@ 6d. per lb.	4	19	—	.75
Total Animal Food . . . . .				83	106	60	7.35
Bread . . . . .	10	282	@ 2 $\frac{1}{2}$ d. per 2 lb.	26	3	141	.78
Potatoes . . . . .	7 $\frac{1}{2}$	210	@ 8d. per st.	2	—	30	.26
Peas, beans, &c. . .	3 $\frac{1}{2}$	97	@ 2d. per lb.	21	1	57	.40
Oatmeal . . . . .	2	56	@ 2d. per lb.	8	4	37	.25
Sugar . . . . .	1 $\frac{1}{2}$	40	@ 2 $\frac{1}{2}$ per lb.	—	—	40	.22
Jam . . . . .	2	56	@ 3 $\frac{1}{2}$ d. per lb.	—	—	33	.44
Rice, &c. . . . .	$\frac{1}{2}$	16	@ 2 $\frac{1}{2}$ d. per lb.	1	—	13	.08
Flour . . . . .	2	56	@ 1s. 6d. per st.	7	1	39	.16
Green vegetables . .	6	170	—	1	—	8	.25
Sundries . . . . .	—	—	—	4	—	10	.50
Total Vegetable Food . . . . .				70	9	408	3.34
Total Food . . . . .				153	115	468	10.69
Total Calorie value 3616 Ratio of cost of Animal to Vegetable Food 68.7 : 31.3 No. of Grammes of Proteid bought per penny 14.3 Calories bought per penny 337							

<sup>1</sup> Uncooked and including bone, &c., and comprising beef, mutton, pork, tinned beef, and mutton, &c.

\*.\* The above diet could be bought retail in London from 6s. to 6s. 6d. per man, per week, for an average-sized family, according to the quality of food purchased.

contained in fact 20 grammes more of proteid daily than our average standard diet for the working man in health, and had a somewhat larger Calorie value. In spite of this slightly increased nutritive value, this diet only cost 10-6d. a day, and for every penny spent upon it, 14-3 grammes of proteid and 337 Calories were purchased. From an economic standpoint, then, the diet was also quite satisfactory.

The average diet actually taken by the three patients is shown in the table on the preceding page.

## II. OBSERVATIONS AT COPPIN'S GREEN SANATORIUM.

One of us (J.E. C.) has been able to make further observations upon the clinical and economic value of diets containing a considerable amount of vegetable proteid in the treatment of consumption. These observations have been made at Coppin's Green Sanatorium and Market Garden Colony, which has been established with the object of providing efficient treatment for consumptives at the lowest possible cost compatible with efficiency and a due degree of comfort. The dietary for convalescents and workers at Coppin's Green has been modelled upon the lines already laid down, the following points especially being borne in mind:—

1. The proteid value of the diet has to be 150 grammes, and the Calorie value, approximately, 3400.
2. In composition and general construction it has to be as much as possible like the diets taken in everyday life by the working classes.
3. The necessary increase in nutritive value, as compared with diets suitable for people in ordinary health,

must be made in the cheapest possible way, viz. by the addition of vegetable proteid, such as oatmeal, pulses, &c.

The diet, as originally prescribed, was as follows :—

Milk . . . . .	20 oz.	} as purchased.
Meat . . . . .	9 "	
Bacon . . . . .	2 "	
Pulse . . . . .	3 "	
Cereals . . . . .	$\frac{1}{2}$ "	
Egg . . . . .	$\frac{1}{2}$ "	
Oatmeal . . . . .	2 "	
Flour . . . . .	2 "	
Butter . . . . .	1 "	
Bread . . . . .	8 "	
Sugar . . . . .	3 "	
Cheese . . . . .	2 "	
Potatoes . . . . .	8 "	
Jam . . . . .	1 "	

In practice this diet had to be slightly modified. We had calculated that cheese would be used in cooking, e.g. toasted cheese, macaroni cheese, &c., but we found that the patients did not care for these dishes, apparently because they were unaccustomed to them. Cheese has since been given plain, and we have found that the average amount consumed per man works out at half an ounce per day, instead of 2 oz. as originally prescribed.

We also found that the pulse foods were never well taken in made dishes, although well taken either as vegetables or in the form of soup. To secure plenty of variety we decided to give a certain amount of fish, liver, sausage, &c., at supper whenever the pulses were taken at dinner as a vegetable.

After three months' trial of this diet, as slightly modified, the whole of the food eaten by the patients for one week was accurately determined by weighing.

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The following table shows the average daily amount of the various food-stuffs taken per head by the fourteen men who were under observation :—

<i>Breakfast, 8.30 a.m.</i>	Porridge, $\frac{1}{2}$ pt. (oatmeal 2 oz.). Bacon (cooked), 1.5 oz. Milk, 5.8 oz. Loaf sugar, .8 oz. Dem. sugar, 1.6 oz. (taken with the porridge). Bread, 2.0 oz. Butter, .22 oz.
<i>Dinner, 1.30 p.m.</i>	Roast joint, cooked, 4.45 oz. = 8.65 oz. as purchased. Baked potatoes, 4.4 oz. = 8 oz. as purchased. Suet pudding (various), 5.4 oz. Milk, 10 oz. Pulses as vegetable or in other ways, 2.9 oz.
<i>Tea, 5 p.m.</i>	Bread, 4.6 oz. or Jam (alternately) 1 oz. Cake        ,,        .4 oz. Butter, .5 oz.
<i>Supper, 8 p.m.</i>	Pulse soup (alternate days), 8 oz. = $\frac{1}{2}$ pt. of soup. Liver, fish, sausage (alternate days), 4.2 oz. Milk or cornflour puddings, 5.5 oz. Bread, 1.6 oz. Butter, .1 oz. Cheese, .5 oz. Milk, 1.8 oz. Cocoa (dry), .8 oz. Sugar, .9 oz.

The next table has been worked out for comparison with the other dietetic summaries, previously recorded. It shows the amounts of the various food-stuffs taken daily per head, the nutritive value and cost of the same, and the prices at which the various materials can be bought per lb. or per oz., &c.

An addition of 10 % should be made to the cost to allow for waste in cooking, &c., as this dietary was worked out from results obtained by weighing the food as served.

## 153

OF OBSERVATION PER MAN PER DIEM.

[illegible]



## CRITICISM ON THE COPPIN'S GREEN SANATORIUM DIET.

**Nutritive Value. Palatability, Variety, &c.**

The proteid value of the diet works out at almost exactly the amount which we aimed at, viz. 150 grammes. The total Calorie value, viz. 3889, was somewhat in excess of that which we aimed at, though quite satisfactory.

This slight increase in the total Calorie value was due to some of the patients having taken rather more fat and carbohydrate than was anticipated, and especially extra sugar with their porridge. Some of these individuals were doing a good deal of manual work in the garden, so that this increase in energy-giving food was quite justified. In actual practice the diet is found to be most satisfactory with respect to its palatability and variety. It has given uniform satisfaction to the patients, and we might add that exactly the same diet is taken by the medical superintendent and other members of the Sanatorium staff. Although very economically constructed, whole milk and butter are used rather than margarine and separated milk, the use of which would have resulted in still further economy, and joints of meat are used daily.

The great point in the diet is that the extra amount of nourishment required by the consumptive, especially the increase of proteid, is given in the cheap form of vegetable proteid. The vegetable proteid, however, is given in comparatively small amounts, and in a palatable way. It is scarcely necessary to add that all the food is very carefully cooked and prepared, and considerable pains are taken to vary the diet from day to day.

## VEGETABLE AND MEAT DIETS 155

The following sample week's menu, shows the degree of variety which the Coppin's Green Sanatorium diet allows :—

WEEK'S MENU AT COPPIN'S GREEN SANATORIUM.

	<i>Breakfast.</i>	<i>Dinner.</i>	<i>Tea.</i>	<i>Supper.</i>
<b>SUNDAY.</b>	Porridge and milk, cold ham, tea, bread and butter.	Roast beef, baked potatoes, boiled peas, fruit tart.	Tea, bread, butter, cake.	Tinned salmon, sponge cake and custard, bread and cheese.
<b>MONDAY.</b>	Porridge and milk, fried bacon (rest as above).	Boiled mutton, potatoes and greens, date pudding.	Tea, &c., jam.	Bean soup, macaroni pudding.
<b>TUESDAY.</b>	Porridge and milk, fried bacon.	Cottage pie and haricot crust, suet roll and jam.	Tea, &c., cake.	Fried liver, blanc-mange, stewed fruit.
<b>WEDNESDAY.</b>	Porridge and milk, fried bacon.	Stewed steak and onions, potatoes, boiled ginger pudding.	Tea, &c., lettuce.	Pea soup, boiled rice, and jam.
<b>THURSDAY.</b>	Porridge and milk, cold ham.	Roast mutton, boiled beans, bread pudding.	Tea, bread, butter, and jam.	Sausage or fish, bread and butter pudding.
<b>FRIDAY.</b>	Porridge and milk, bacon.	Boiled beef and vegetables, potatoes, plum duff.	Tea and cake.	Lentil soup, baked lemon pudding.
<b>SATURDAY.</b>	Porridge and milk, bacon.	Beef steak and kidney pie, boiled peas, milk pudding.	Tea, &c., jam.	Stewed kidney and macaroni, blanc-mange, stewed fruit.

## CLINICAL RESULTS OBTAINED AT COPPIN'S GREEN SANATORIUM.

ONLY PATIENTS WHO HAVE TAKEN THE DIET PRESCRIBED THROUGHOUT THEIR STAY ARE INCLUDED IN THIS TABLE.

No. of Case.	Type.	Condition on Admission.			Condition on Discharge.	Gain of Weight.
		No. of Lobes Diseased.	Temperature Range.	Appetite and Digestion.		
1	Recent Infiltration	3	99°-101°	Good	Complete arrest	14 lb.
2	" "	3	98°-99°	Fair	Incomplete arrest A	14 lb.
3	" "	2	98°-99°	Good	Complete arrest	4 lb.
4	" "	3	98°-99.4°	Good	Incomplete arrest A	7 lb.
5	" "	2	97.5°-99°	Good	Complete arrest	8 lb.
6	" "	2	97.5°-99°	Good	" "	11 lb.
7	" "	3	97°-99°	Good	" "	7 lb.
8	" "	3	98°-99°	Good	Incomplete arrest A	10 lb.
9	" "	1	97.5°-100°	Good	Complete arrest	21 lb.



**Clinical Efficiency.**

From a clinical standpoint it has proved most satisfactory. As we expected, the patients treated on it have made excellent progress, as shown by the improvement in lung condition and restoration of general health. The average gain of weight per head works out at one pound and a half per week, a most satisfactory figure ; in the case of patients much below their body weights the weekly gain of weight is considerably greater, e.g. often two pounds or more.

We give a table showing the clinical results obtained at Coppin's Green Sanatorium on the diet as just described. This requires little comment ; it is perhaps sufficient for us to say that the results thus tabulated are most satisfactory and represent as great a measure of success in treatment as we have obtained anywhere.

We should perhaps add that the diet has not in any case given rise to any indigestion or other alimentary disturbance, and is always readily taken.

It, however, is moderately bulky, and requires some alteration in the direction of concentration—(a) for invalids, (b) in hot weather. Invalids take much more milk—the amount varying with individual requirements—and less of the solid food. In hot weather we find it advisable to give an extra half-pint of milk and use lighter puddings daily in order to secure the taking of the requisite nutritive value. This adds to the cost of the diet but is justified by results.

Of the fifteen patients treated, six were discharged perfectly restored to health, i.e. with no physical signs incompatible with a completely healed lesion.

Six were discharged perfectly restored to health, though with some slight physical signs still remaining. Two patients with advanced chronic disease improved considerably, and the remaining patient—an acute case still under treatment—has made excellent progress, having gained 21 lb. in weight and his disease having become quiescent.

Some months' further experience with the diet since the preparation of this table of results has confirmed our conclusions as to its all-round efficiency and thoroughly satisfactory character.

#### **Economic Efficiency.**

In addition to this diet being efficient from a clinical and nutritive standpoint, it is also most satisfactory from an economic standpoint. From our tables it will be seen that the weekly cost of this diet per head works out at 11½*d.* per day or 6*s.* 8*d.* per week.

To summarize. The Coppin's Green Sanatorium diet represents the most satisfactory dietary from every standpoint that we have been able to construct for use by the working-class consumptive. It has a thoroughly adequate nutritive value, viz. proteid 154 grammes and Calories 3889 daily. It is very palatable, easily digested, and allows of a considerable variety being made in the menu from day to day. It is economically constructed, since every 1*d.* spent upon it buys 13.2 grammes of proteid and 336 Calories.

The following table of comparison of the various diets we have used in the course of our observations showing their relative efficiency, may be of interest :—

# 160 CONSUMPTIVES TREATED ON

COMPARISON OF VARIOUS DIETS USED DURING THE OBSERVATIONS.

<i>Diet.</i>	<i>Proteid.</i>	<i>Calories.</i>	<i>Cost retail in pence.</i>	<i>Grammes of Proteid bought per penny.</i>	<i>Cals. bought per penny.</i>	<i>Criticism as to Efficiency.</i>
Standard Normal Diet (average of 100 diets)	127	3687	10.2	11.5	336	Efficient in every respect for normal health.
Cottage Sanatorium Diet as prescribed	155.8	3448	12.13	12.8	284	Efficient in every respect.
Cottage Sanatorium Diet as actually taken	208.5	4400	16.14	12.9	272	Excessive nutritive value, therefore economically unsound.
Average meat-free diet taken by three patients	165.4	4045	10.97	14.9	367	Efficient clinically and economically but not sufficiently palatable.
Modified diet containing a good deal of vegetables and some meat	153	3616	10.69	14.3	337	Efficient in every respect.
Diet at Coppin's Green Sanatorium	154	3889	11.57	13.2	336	The most efficient in every respect.
Cheap diet in the Appendix	156	3476	8.24	18.9	409	Efficient but not very palatable.

In the table we have included also an adequate diet costing only 8d. per day, details of which will be found in the Appendix.

## CHAPTER VIII

### PRACTICAL CONCLUSIONS

IN this, our final chapter, it will be our aim to extract from the long series of observations that have been described in detail, certain practical conclusions which ought, we think, to be of value, not only to medical men and to those who have the charge of consumptives in Sanatoria or elsewhere, but also to consumptives who have to treat themselves at home.

Our object is not easy of attainment. In the first place, the vast majority of people are not accustomed to think of diets in exact terms, either as to the amounts of the various ingredients, or their nutritive values. To be very exact, a dietary has to be sketched out in minute detail, detail which one cannot expect to see attended to by individuals in everyday life. In the case of Sanatoria, a closely worked out dietary scale is of considerably more use, since, when dealing with a number of individuals, it is a simple enough matter to prescribe and order a definite dietary. Again, it is impossible to speak arbitrarily on the question of cost, as the prices of food-stuffs vary appreciably in different parts of the country. They also differ in town and country.

We propose firstly, then, to give advice and directions as to economic and efficient diets for the guidance of those who have to feed consumptives on a large scale in Sanatoria and elsewhere, and secondly, in conclusion, to provide clear and simple instructions



and recipes—explaining what food they had better buy and how to cook it—for the benefit of poor consumptive patients who are fending for themselves.

That our poor are ill-equipped for the battle against disease, as much through ignorance as through poverty, is well known. The fact has often been deplored. Especially in the matter of food, they buy dearly, do not get good value for their money, and do not make the most of what they have. It is hoped that the hints here given will help them.

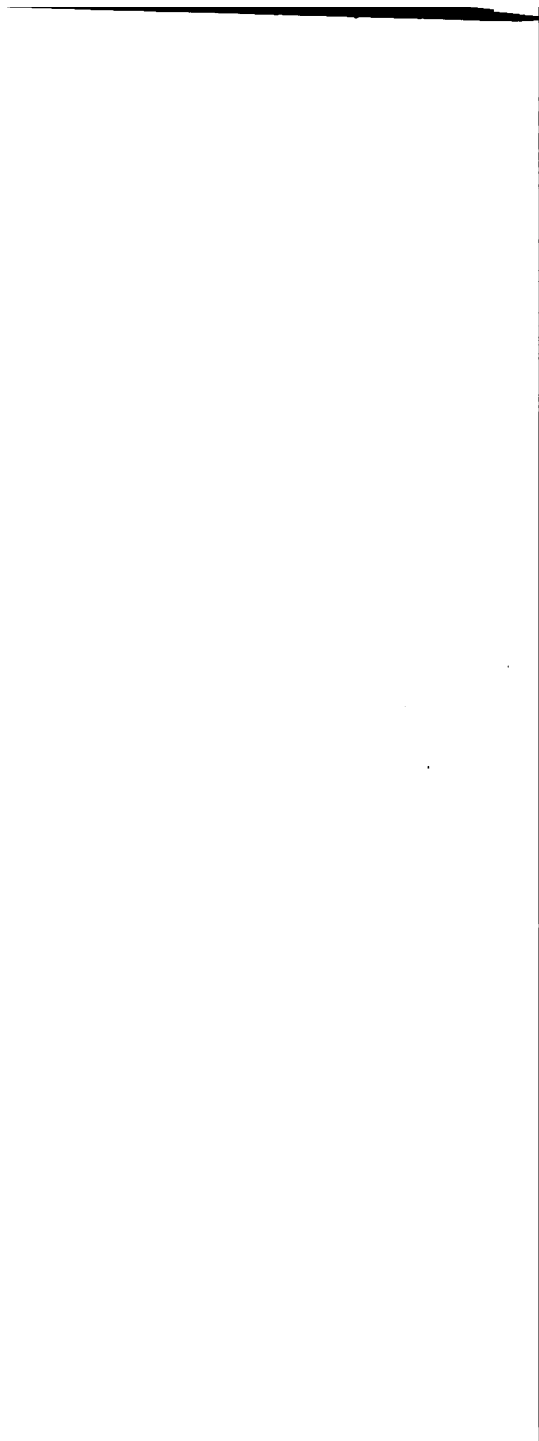
With regard to the diet of the poor man, there is one fact that must never be lost sight of. It is of the utmost import. We have to bear in mind that a diet which is cheap in respect of the actual food-stuffs required, may be really expensive if it requires much preparation or cooking, for it probably takes up time which would otherwise be devoted to wage-earning. Again, it may require an increased consumption of fuel for cooking, which is also a serious item in the menage of the poor.

To prescribe such a diet as that we have been speaking of is to court failure, since it is quite certain that the directions will never be carried out. Hence, in actual practice, wherever possible, it appears best to give only very general directions on paper, and to advise each patient as to detail, according to his circumstances.

#### **Directions to Medical Men, Sanatoria, &c.**

In the table on the following page we give, in parallel columns, details of four dietaries, all of which are adequate in nutritive value for the efficient treatment of consumption, and the cost of which varies from 4*s.* 6*d.* to 7*s.* per week. The first of these four diets, costing 7*s.*





per week, or 11.7*d.* per day, is very similar to the diet which is found so suitable at the Coppin's Green Sanatorium. It is a diet which will be found thoroughly satisfactory for use in Sanatoria and for the working classes, using the term 'Working Classes' in its broadest sense.

It will be noted that in the cheaper dietaries economy is effected—

1. By reducing the amount of whole milk, and replacing it either in part or entirely by separated milk.

2. By buying cheaper forms of meat.

3. By increasing the amount of bread and pulses.

4. By the substitution of margarine for butter.

The palatability and variety of the diets vary with their cost. The cheapest of the diets, costing 7.7*d.* a day, can be made quite reasonably palatable with a little care.

In actual practice it is found very difficult to construct a diet of adequate nutritive value, for use by consumptives, at a lower figure than 7½*d.* per day.

The ordinary mixed diet taken by most people can always be reduced in cost by replacing some of the meat by vegetables, such as the pulses, peas, lentils, &c. It is not advisable to secure a greater degree of economy by excluding all the meat, as the diet is thereby made too unpalatable for the average person.

Diet 1 on our table, which we recommend for use when possible, we know by experience will satisfy the requirements of the average working man. The amount allowed for the purchase of the several items of food, allows a considerable variation being made from

time to time in the diet. Thus, purchasing meat at an average price of  $7d.$  per pound, allows of the inclusion of every joint of foreign beef at  $7\frac{1}{2}d.$  per pound, Canterbury lamb or mutton at  $7d.$  per pound, meat for meat puddings at  $4d.$  or  $5d.$  per pound, and of liver, kidney, sausage, &c. Finnan haddock, cod, &c., and especially tinned salmon, to which the working classes are particularly partial, may also be included in the list of food-stuffs from which selection can be made. The composition of this diet also allows for a suet or milk pudding every day. It will be noticed that a pint of milk and an ounce of butter are also included.

The price of the various food-stuffs from which the total cost of this diet ( $11.74d.$  per day) has been calculated, are the prices at which we have actually bought the various articles retail, at ordinary shops, and in retail amounts.

In Diet 2, which costs  $10.18d.$  per day, economy has been effected by giving only half a pint of whole milk and replacing the other half-pint by half a pint of separated milk. The ounce of butter at  $1s.$  per pound is replaced by one ounce of margarine at  $8d.$  per pound, and  $6d.$  per pound is allowed for meat instead of  $7d.$  This means that, for the most part, the cheaper forms of meat will have to be bought.

In Diet 3, which costs  $9.12d.$  per day, no whole milk is included, a pint of separated milk being used instead, and only  $5d.$  per pound is allowed for meat.

Still further economy, as shown by the fourth diet, at a cost of  $7.7d.$  per day, is obtained by reducing the amount of separated milk to 5 oz. per day, and the amount of meat to 6 oz. per day. As compensation, the daily amount of cheese is increased by 1 oz.,

the amount of bread by 4 oz., and the amount of proteid by 1 oz. Such a dietary as this will only be necessary when dealing with the very poor.

DIRECTIONS GIVEN TO PATIENTS WHO ARE BEING TREATED AT HOME: SUITABLE FOR HOSPITAL OUT-PATIENT DEPARTMENTS, MEDICAL OFFICERS OF HEALTH, SANATORIUM PHYSICIANS, ETC.

You require to take much more food than you did before you became consumptive. Do not hurry over your meals; you will feel satisfied frequently before you have eaten enough, and you must continue to eat even when you do not want more food. Your appetite is no guide as to the amount you need. The best way to find out whether you are eating enough is to weigh yourself every week always at the same time of day and in the same clothes. If you have not gained at least one pound during the week you will know you have not been eating enough.

**What Food to buy, and how to cook it.**

The following is intended to give you a rough idea as to how you can arrange your meals most satisfactorily, and the amounts of the various foods you require.

*Breakfast.*—Half a pint of porridge with milk and sugar, a rasher of bacon or a herring, &c., a round of bread. Tea or coffee.

*Dinner.*—Two large chops or a large plateful of meat, with plenty of potatoes. A teacupful of milk pudding or a large slice of suet pudding, half a round of bread, and a glass of milk.

*Tea.*—At least three rounds of bread and butter with jam, or, if you can afford it, other relish.

*Supper.*—Half a pint of pea, bean, or lentil soup, or half a pint of porridge, two rounds of bread, with sufficient cheese for both pieces, and a glass of milk.

If you take this diet you ought to gain at least a pound a week in weight, but if you do not do so, your best course is to take more milk until you do gain weight.

The above diet should cost you about 6s. 6d. per week, but you will require to be careful as to what you buy, and the following notes will probably be of service to you in showing you how to spend your money to the greatest advantage.

*Meat.*—If you cannot afford to buy English meat, buy the best foreign, which contains just as much nourishment and will not cost you more than 6½d. per pound for the best joints. If you cannot afford to buy joints you must be content to buy 'pieces'. Make full use of tripe, sausage, bullock's liver and kidney, which are cheap and nutritious, but do not waste money on veal and lamb.

*Butter.*—Buy butter at 1s. a pound if you can afford it, but if money is scarce buy good margarine instead at 6d. or 8d.

*Milk.*—You can always get new milk at 1½d. or 2d. per pint, but if you cannot afford to buy much new milk, buy what you can afford, and make up with separated milk, which will cost you 1d. or 1½d. per quart.

*Cheese.*—Dutch cheese will cost you 4½d. to 6½d. and American 6d. or 7d. Do not buy more expensive

cheese, as you will get no more nourishment for the extra cost.

*Eggs.*—Except during the early summer eggs are always an expensive form of food, therefore do not spend more on them than you can help.

*Oatmeal.*—Oatmeal is one of the very best and cheapest foods you can have. Buy coarse Scotch oatmeal, Provost or Quaker oats, and have a plateful of porridge every morning, and if you like it, occasionally at supper also instead of the soup.

*Dried peas, beans, and lentils.*—These, like oatmeal, are most valuable foods for you, and should be used every day either boiled as a vegetable for dinner or as a soup for supper. You can buy them at the grocer's: the peas and haricot beans will cost you 2½d. per pound or pint and the lentils 2d.

*Potatoes.*—These are required every day, and you will save money if you buy at least a stone at a time.

*Fish.*—Buy fish instead of meat occasionally for the sake of a change, either cod, plaice, herrings, bloaters, finnan, or fresh haddock, or whatever fish is in season and cheap. Tinned salmon at 5d. a tin is a cheap and nutritious food, and forms a good change for supper.

The following rough directions for cooking may be of use:—

*Porridge.*—Stir oatmeal gradually into boiling water, add a pinch of salt, and cook gently, stirring occasionally for an hour (Quaker and Provost oats take only 20 minutes to cook). Allow two teacupfuls of water and two level tablespoonfuls of oatmeal to each man.



*Lentil, pea, or bean soup.*—Soak the seeds in cold water overnight. Boil gently in plenty of water until soft; the cooked seeds may either be eaten as a vegetable or they may be beaten to a fine paste, or, better still, rubbed through a sieve; add a little of the liquid in which they were boiled, and a flavouring if required, to form a highly nutritious soup. Allow three level tablespoonfuls of the raw seeds for each man.

*Suet puddings.*—1. Allow one level teaspoonful of dripping, three level tablespoonfuls of flour, and a large pinch of baking powder per man. Mix the dripping thoroughly with the flour and baking powder. Make the whole into a paste with a little water, form into a roll, flour the surface, tie up tightly in a pudding-cloth, and boil for two or three hours. Serve with syrup, gravy, or jam.

2. Or the above paste may be rolled out flat, spread jam or syrup upon it, roll, fold in the ends, flour the surface, tie tightly in a cloth, and boil for two or three hours.

3. Allow one level teaspoonful of dripping, three level tablespoonfuls of flour, a large pinch of baking powder, and a little sugar and fruit for each man. The fruit may be either currants, figs, or dates chopped up finely, or raisins. Mix the flour and dripping and sugar, add the fruit, and make into a paste with a little water, flour the surface, and tie tightly in a cloth; boil two or three hours. Instead of the fruit a little syrup and a pinch of ground ginger may be used in the above mixture.

*Milk pudding.*—Allow two level teaspoonfuls of rice, sago, tapioca, &c., and two-thirds of a pint of milk for

each man, and a small teaspoonful of sugar per man. Put the rice, sugar, and milk, with a pinch of salt, into a pie-dish, and bake slowly in the oven for two or three hours.

The above directions have stood the test of experience; they have been given to patients and used by them, results being carefully tested. The improvement in lungs and general health, gain in weight, &c., prove them (in all the cases we have followed) to be most satisfactory.

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## APPENDICES

- I. SUMMARY OF SANATORIUM DIETS (IRVING FISHER).  
TABLES I-III.
- II. ON THE TREATMENT OF CONSUMPTIVES WITH MEAT-FREE DIETS. REPORT BY DR. RUTH WILSON,  
CRIOLET SANATORIUM, LOUGHTON, 1903-4.
- III. DIETARY COSTING 8*d.* A DAY ADEQUATE FOR THE  
TREATMENT OF PULMONARY TUBERCULOSIS.

# APPENDIX I. IRVING FISHER'S TABLES.

TABLE I.—UNMEASURED DIET (AMERICAN). (ARRANGED IN ALPHABETICAL ORDER OF LOCATION.)

<i>Institution.</i>	<i>Location.</i>	<i>Physician in Charge.</i>	<i>Food.</i>	<i>Meals.<sup>1</sup></i>	<i>Remarks.</i>
Maryland St. Hosp. Montefiore Home Boulder San.	Baltimore Bedford Sta., N. Y. Boulder, Col.	Louis Hamman L. Rosenberg W. H. Riley (formerly). (No longer takes tbc. cases)	Ordinary Meat selection	8( + 2)	'As liberal supply as they can manage.' Moderate force-feeding. High proteid. Moderate Calories. Meat only when other proteid not relished. Usually those who tired of other proteid also tired of meat. Some force-feeding. All stages. Uses oils combined with corn syrup, gets more wgt. gaining than when uncombined. Force-feeding. One man took 29 glasses of milk a day. Force-feeding. Reaction against force-feeding, causes stomach trouble. Individualizes. Opposed to force-feeding.
King's Co. Hosp. Brooklyn Home for Conv.	Brooklyn, N. Y. Brooklyn, N. Y.	J. F. Fitzgerald E. Reynolds	Ordinary		
Nordrach Ranch	Colorado Springs	Jno. E. White	Milk the staple		
Pembroke San. Nat. Jewish Hosp.	Concord, N. H. Denver, Col.	H. T. Fontaine M. Collins	Ordinary (much fat)		
Y. M. C. A. Health Farm Hotel Dieu (Sisters' Hosp.) U. S. Gen. Hosp.	Denver, Col. El Paso, Tex. Ft. Bayard, N. M.	Jno. Wethered Outside physicians Geo. Bushnell	Ordinary Ordinary Ordinary		
Sanit. Gabriels Muskoka Cottage San.	Gabriels, N. Y. Gravenhurst, Ont.	W. H. Clancy J. H. Elliott		8( + 3)	Amount consumed limited only by capacity and desire. Force-feeding. 'We constantly see cases of tuberculosis in which there is a steady gain in weight from week to week, though a very small amount of food is taken.'
Muskoka Free Hosp. State Hosp. Stony Wold San.	Gravenhurst, Ont. Howard, R. I. Lake Kushaquia, N. Y.	E. D. Parfit F. B. Jewett H. S. Goodell	Ordinary Ordinary	8( + 2)	Moderate force-feeding. Mixed diet; preponderance of proteid and fat.

Loomis San. Pottenger San. South Mt. Camp San.	Liberty, N. Y. Monrovia, Cal. Mount Alto, Pa.	Dr. King F. M. Pottenger A. M. Rothrock	Ordinary	8( + 8)	Considerable fruit. Few nuts. Reaction against force-feeding. No restraint on amount of food. Be- lieves, however, in limiting proteid. Unlimited use of eggs.  Includes cod-liver oil and Maltzyme.
Riverside San. Seton Hosp. St. Joseph's Hosp.	N. Y. City N. Y. City N. Y. City	H.S. Westmoreland R. C. Garlock C. M. Cauldwell	Ordinary Uses beer	8 8 8(+2 or 8)	Average diet consists of 6 or 8 raw eggs, 2 qts. milk and full meal at dinner-time. Patients often gain better upon three meals than when the two lunches are added. Also some gain better upon 6 eggs than when they have been given as high as 16 in a day. Applies domestic science and balanced bills of fare.
Grand View Inst. for Cons.	Oil City, Pa.	H. E. Kirshner	Ordinary + nuts	(3 + 8)	Much liquid; 8 qts. milk, 6 raw eggs, and 1 full meat meal daily. Force-feeding. Reaction against force-feeding.
Ottawa Tent. Colony	Ottawa, Ill.	J. W. Pettit	Ordinary	8	Force-feeding. Moderate force-feeding. Least to gain weight, ideal is 20 lb. above normal, av. gain 30 lb. High nitrogen. Reaction against over-feeding, indivi- dualizes.
R. I. State San. Phila. Gen. Hosp.	Pascoag, R. I. Philadelphia	H. L. Barnes Wm. B. Stanton	Ordinary + nuts	8( + 3)	Individualizes. Much fat. Large gains in weight. Finds that any one can take milk and eggs granting they are the right quality.
N. Y. State Hosp. Mass. State San. West Mt. San. Sharon San. New Mexico Cottage San.	Ray Brook Rutland, Mass. Scranton, Pa. Sharon, Mass. Silver City, N. M.	Burnham W. J. Marclay J. M. Weinwright W. S. Griffin E. S. Bullock	Ordinary	8	
Mt. St. Rose San. Washington Asylum Sunnyrest San.	St. Louis, Mo. Washington, D. C. White Haven, Pa.	Wm. Porter L. F. Zinkhan E. Stockdale	Ordinary + fruit & nuts	8 1( + 5)	

<sup>1</sup> The numbers in parentheses are extra lunches additional to regular meals. These extra lunches usually consist of milk and eggs.

TABLE II.—UNMEASURED DIET (FOREIGN). (ARRANGED IN ALPHABETICAL ORDER OF LOCATION.)

<i>Institution.</i>	<i>Location.</i>	<i>Physician in Charge.</i>	<i>Food.</i>	<i>Medic.</i> <sup>1</sup>	<i>Remarks.</i>
Tonasaasen	Christiania, Nor.	Andvord		.	Against force-feeding. Patients should 'reduce outgo instead of increase income', i. e. rest instead of overfeed.
Turban's San.	Davos-Platz, Switz.	S. Turban			Force-feeding.
San. Brehmer	Goerbersdorf, Ger.	Von Hahn		5	Force-feeding. Proteids and fats.
Institut für Pharmakol. und Physiol. Chem. Römpler's San.	Rostock, Ger.	R. Kobert			No restriction in diet.
San. Grand Hotel	Goerbersdorf, Ger.	Th. Römpler			Seen many digestions ruined by over-feeding, yet patients without appetite should be urged.
Mt. Vernon Hosp. Nordrach-Colonie	Leysin, Switz.	Echaquet			Individualizes.
	London	T. N. Kelynaek			Minimum diet for wt. gaining. Individualizes. Some hardly any meat, others much. 'Av. $\frac{1}{3}$ meat and albuminous, $\frac{1}{3}$ fat, $\frac{1}{3}$ farinaceous, ordinary diet about 15 % protein, 85 % fat.'
Kremser San.	Nordrach, Ger.	Otto Walther	Ordinary	8(+2)	'I absolutely disagree with the general superalimentation practised in many sanatoriums—my experience proves that an over-feeding has not the least favourable effect in weight gaining, but that the chief point is to keep the proper balance in the composition of the diet, i. e. proteids, fat, and carbohydrates, like 1:3 resp. 1:4 $\frac{1}{2}$ . Much meat; opposed to diet regulation.
	Sulzhayn	Kremser			
	St. Petersburg, Russia.	Simon de Unterberger			

<sup>1</sup> The numbers in parentheses are extra lunches additional to regular meals. These extra lunches usually consist of milk and eggs.

TABLE III.—MEASURED DIET. (IN ORDER OF QUANTITY OF FOOD USED.)

<i>Institution.</i>	<i>Location.</i>	<i>Physician in Charge.</i>	<i>Foods.</i>	<i>No. of Meals.</i>	<i>Proteid.</i>	<i>Fat.</i>	<i>Carbo- hydrate.</i>	<i>Total Calories.</i>	<i>Remarks.</i>
Roten Kreuz San.	Grabowsee, Ger.	Werner			1200	2200	2100	5500	
Maine San.	Hebron, Me.	Estes Nichols	Ordinary		840	1900	1640	4880 at first	Does not include extra eggs and milk.
Post Graduate Annex.	N. Y. City	John F. Russell			500	1200	1600	3800 later	
		For rest treatment only milk, bread, butter, emulsion, and vegetable juice. In all cases excludes alcohol, tobacco, tea, coffee, chocolate, cocoa, beef-tee, meat extracts, meat juice, and vinegar.			510	2165	1565	4240	Average diet under rest treatment. Uses glycerine, calcium chloride, and cathartics systematically; ambulant cases use more food. In selected cases omits meats.
Bakneas San.	Christiania, Norway	Edw. Kaurin			820	1860	1470	4150	
Royal Nat. Hosp. for Cons.	Ventrnor, Isle of Wight		Ordinary		700	1660	1640	4000	Average diet.
Agnes Memorial San.	Denver, Col.	G. W. Holden	Ordinary	3	830	1665	1470	3965	Greater gains of weight on 8 than on 5 meals.
Reception Hosp.	Saranac Lake, New York	E. R. Baldwin	Ordinary	3 + (2)	650	2000	1350	3900	
Millet San.	East Bridge-water, Mass.	C. S. Millet	Ordinary	3	600	1500	1450	3550	Average 4 days one patient.



TABLE III.—MEASURED DIET. (IN ORDER OF QUANTITY OF FOOD USED.)—Continued.

Institution.	Location.	Physician in Charge.	Foods.	No. of Meals.	Protein.	Fat.	Carbo-hydrate.	Total Calories.	Remarks.
Gaylord Farm San.	Wallingford, Conn.	D. R. Lyman		8	530	1430	1540	3550	No force-feeding except in special cases. Most are restrained from over-eating. Average gain in weight of the 10 discharged cases whose average diet was given was 19 lb. in from 8 to 6 months, varying from 13 to 22, proteid from 840 to 680, fat from 1100 to 2000, and the Calories of the ten varied from 2700 to 4100. Those 10 cases were heavier eaters than the average. They had 8 meals and one or two glasses of milk between meals. No extra eggs. Seven were males, 3 females, 5 were at or above their normal weight when discharged (by insurance tables), 5 below.
Pine Ridge Camp	Providence, R. I.	W. H. Peters	Ordinary		900	1700	900	3500	Fairly early weight gaining cases.
U.S. Pub. Health & Marine Hosp. Ser.	Ft. Stanton, N. M.	P. M. Carrington			650	750	1900	3300	Based on standard diet of U.S. Health & M. H. Ser. with addition of milk and eggs.
Stadt. San.	Munich	Filler	Ordinary		570	1180	1570	3270	If necessary.
					500	1380	1280	3050	<i>Journal of Outdoor Life</i> , January, 1906.

San. Falkenstein	Falkenstein, Ger.	Goodbody, Bardwell, & Chapman			480	1800	1220	3000	<p>Most suitable diet for tuberculosis, <i>Med. Chr. Trans.</i>, Vol. LXXXIV, 1902, pp. 119, 120.</p> <p>Proposed in <i>Good Health</i>, 1905, by Dr. Herbert Ossig.</p> <p>Opinions on superalimentation agree with Dettweiler his predecessor. Chief aim should not be to make patient as fat as possible, and 'one never can expect a patient to be the more resistant to disease the fatter he is or becomes'. Superalimentation only needed to compensate the loss of proteins and fats; especially needed in feverish cases. In later cases much fat given. In other cases individualizes the diet by weighing the patient.</p> <p>Digestive complications determined by laboratory examinations. For weight gaining fats and carbohydrates predominate.</p> <p>See <i>Open-Air Treatment of Tuberculosis</i>.</p> <p>Average diet.</p> <p><i>American Medicine</i>, September 20, 1902.</p>
		Beasold	Nuts, fruit, and grains exclusively		370	870	1600	2840	
					530	1120	1050	2700 <sup>1</sup> 3400 <sup>2</sup> 2000 <sup>3</sup>	
Winyah San.	Asheville, N. C.	Von Ruck	Ordinary					2500	
Brompton Hosp. for Cons.	London New York	Burton-Fanning	Ordinary, few vegetables	8 + (3)	500	1100	900	2500	
		Williams	Ordinary		410	820	1170	2400	
		W. H. Porter	Excludes potatoes, cereals, fruit, nuts, pastry, most vegetables, soups		600	970	560	2140	

<sup>1</sup> Average.                      <sup>2</sup> Maximum.                      <sup>3</sup> Minimum.

## APPENDIX II

### NOTES OF CASES OF PHTHISIS TREATED AT THE CRIOLET SANATORIUM, LOUGHTON, JULY, 1903, TO JANUARY, 1904

During this period we had nine cases sent as Phthisis; of these, four were early, two advanced, and three complicated by other respiratory trouble.

The treatment was the same as in other Open-air Sanatoria, except as regards diet. This was strictly non-flesh, neither butcher's meat, fish, nor fowl being allowed in either Sanatorium or house in accordance with the stipulations of the gentleman who lent the place for the express purpose of making the experiment. Milk, butter, cheese, and eggs were, however, freely used, together with garden produce of all kinds and fruit; and care was taken to supply a sufficient quantity of proteid food by means of the pulses.

The Sanatorium had been lent for a year, but as it needed much repair before we could take possession, patients were only there for a little over six months, and winter proving that the climate was too damp the experiment had to be given up before a regular diet table could be drawn up and proved to be of real scientific value. By carefully watching the general condition and weight of the patients, however, it was possible to secure a diet that gave very satisfactory results, and the greater variety that vegetarian diets allow was a help in many ways.

Of the four early cases, three had only one lung affected, while the fourth had crepitations at both apices. In three, after a stay of between two and three months, no adventitious sounds could be heard, the dullness had cleared up to some extent, and night sweats had disappeared. The fourth left before all the moist sounds had gone, but his condition had greatly improved, and the after history of the patient, as far as could be ascertained, was satisfactory.

One of the advanced cases was that of a young man of 26, who had been ill for three years, and unable to work. His throat, which had been bad, had healed under treatment, and although the upper lobe of the left lung was considerably affected, and there was a good deal of excavation, still his history seemed to show a tendency to cure, and he was admitted. He had had several slight attacks of haemorrhage, and had one during the six months he was with us, but the local condition made marked improvement, and in strength and general health he made so much progress that I considered him fit for light work on leaving us. After a short time at a Convalescent Home at Hastings, he obtained some suitable employment there, and is, I believe, doing well.

The other advanced case was one which should not have been sent to any Sanatorium, and which we should never have admitted had we been told all the facts. The patient, a young woman of 30, had the right lung completely infiltrated and breaking down, while her larynx was also affected. After a slight improvement during the first month of her stay she lost ground steadily in everything but weight, the other lung went very rapidly, and she died four months after admission from acute pericarditis with effusion. This was the only case in which the question of diet gave me any anxiety. The patient had been accustomed to a great deal of meat, and she felt the restrictions as her appetite grew more capricious, so though she did not suffer in health she did in mind, and I wished her to be taken home for that reason, but all my representations as to the serious nature of her illness failed to induce her relatives to move her. She kept a fair appetite up to the end, and never became emaciated, so that I do not consider that the diet had anything to do with her death.

Besides these cases of pure phthisis we had three complicated with other things.

One little boy of eight had very advanced bronchiectasis, his heart being drawn completely over to the right side. He was a miserable little creature with only one eye, and that almost useless from ulceration of the cornea, but in the two months we had him he improved wonderfully in general health. Very little could be expected of his lungs in that time, but there was less haemorrhage, less expectoration, and it was much less offensive.

Another case sent as phthisis after an attack of pleuro-pneumonia, was found to be chiefly suffering from severe nasal and pharyngeal catarrh. He was only in the Sanatorium one month, but improved greatly in that time.

The third was a case complicated by asthma, that being the most prominent feature. This was one of the cases in which I had a special satisfaction in the non-flesh diet, as in other cases of asthma it had proved most efficacious. The patient had two or three slight attacks while with us, but he gained steadily in weight and strength, and at the end of four and a half months left us so changed that he could hardly be recognized, while a little prolonged expiration was all that could be discovered on auscultation. I know the improvement was maintained all through the winter.

The chief points I noted with regard to the diet were:—

1. The patients enjoyed their food, and none sat struggling over the large amount prescribed, as I have known of their doing for hours in other Sanatoria.
2. We had no trouble with the hepatic disorders so frequently met with in the overfeeding when meat is largely used.
3. The gain in weight was steady, and was due to good material, not mere fat, as I thought might have been the case.
4. We had little difficulty with gastric troubles, and when there was any it was quite easy to find suitable food.
5. Vegetarian diet requires good cooking, even more so than meat diet, but given that, more variety can be secured and more appetizing dishes prepared.
6. It would also certainly be cheaper, even with the fruit which is desirable, but the time during which we made regular observations was too short to enable us to tell just what the saving would be.

M. RUTH WILSON.

## APPENDIX III

DIETARY COSTING EIGHTPENCE A DAY ADEQUATE FOR THE TREATMENT OF  
PULMONARY TUBERCULOSIS.

	Amount.		Price Retail.	Nutritive value.			Cost.
	Ounces.	Grammes.		Proteid.	Fat.	Car.-Hyd.	
Separated Milk . .	20	570	@ 8d. per gallon	19	1	28	1.00
Meat, &c. . . . .	6	170	@ 5d. per lb.	81	20	—	1.88
Margarine . . . .	1	30	@ 6d. per lb.	—	22	—	.88
Suet . . . . .	—	—	—	—	—	—	—
Cheese (Dutch) . .	2	56	@ 5d. per lb.	18	11	—	.63
Egg . . . . .	—	—	—	—	—	—	—
Bacon . . . . .	2	56	@ 6d. per lb.	4	24	—	.75
Total Animal Food . . . . .				72	78	28	4.64
Bread . . . . .	16	460	@ 2½ per 2 lb.	41	5	230	1.25
Potatoes . . . . .	8	280	@ 8d. per st.	2	—	32	.28
Pulses . . . . .	4	112	@ 2d. per lb.	27	2	71	.50
Oatmeal . . . . .	2	56	@ 2d. per lb.	8	4	87	.25
Sugar . . . . .	2	56	@ 2½d. per lb.	—	—	56	.31
Jam . . . . .	1	28	@ 3½d. per lb.	1	—	16	.22
Rice, &c. . . . .	½	14	@ 2½d. per lb.	—	—	10	.08
Flour . . . . .	—	—	—	—	—	—	—
Green vegetables .	—	—	—	5	—	10	.20
Sundries . . . . .	—	—	—	—	—	—	.50
Total Vegetable Food . . . . .				84	11	462	3.59
Total Food . . . . .				156	89	490	8.23

Calories bought per penny 409

No. of Grammes of Proteid bought per penny 18.9

Total Calorie value 8476

Ratio of cost of Animal to Vegetable Food 56.3 : 43.7

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